COAL AGE

McGRAW-HILL PUBLISHING COMPANY. INC.

Price 35 Cents

A Million Tons *On Schedule!*

SUN MINE LUBRICANTS

Reduce Bearing Wear On 1000 Cars . . . End Production Delays

In a mine producing over a million tons of coal a year, proper lubrication of 1000 roller bearing mine cars is a major operating problem. Their lubrication schedule called for greasing every twelve weeks. In the winter, however, it had never been possible to maintain this schedule, because grease stiffened in four or five weeks and failed to lubricate the rollers properly . . . cars were hard to pull . . . bearings suffered excessive wear.

Then a Sun Lubrication Engineer . . . one of those "Doctors of Industry" . . . recommended SUN MINE CAR GREASE for this important job. Following a preliminary successful test, it was adopted as standard. Since that time there has been no lubrication trouble at all . . . every car now runs "on schedule" . . . bearing replacements have been greatly reduced . . . cars roll more easily.

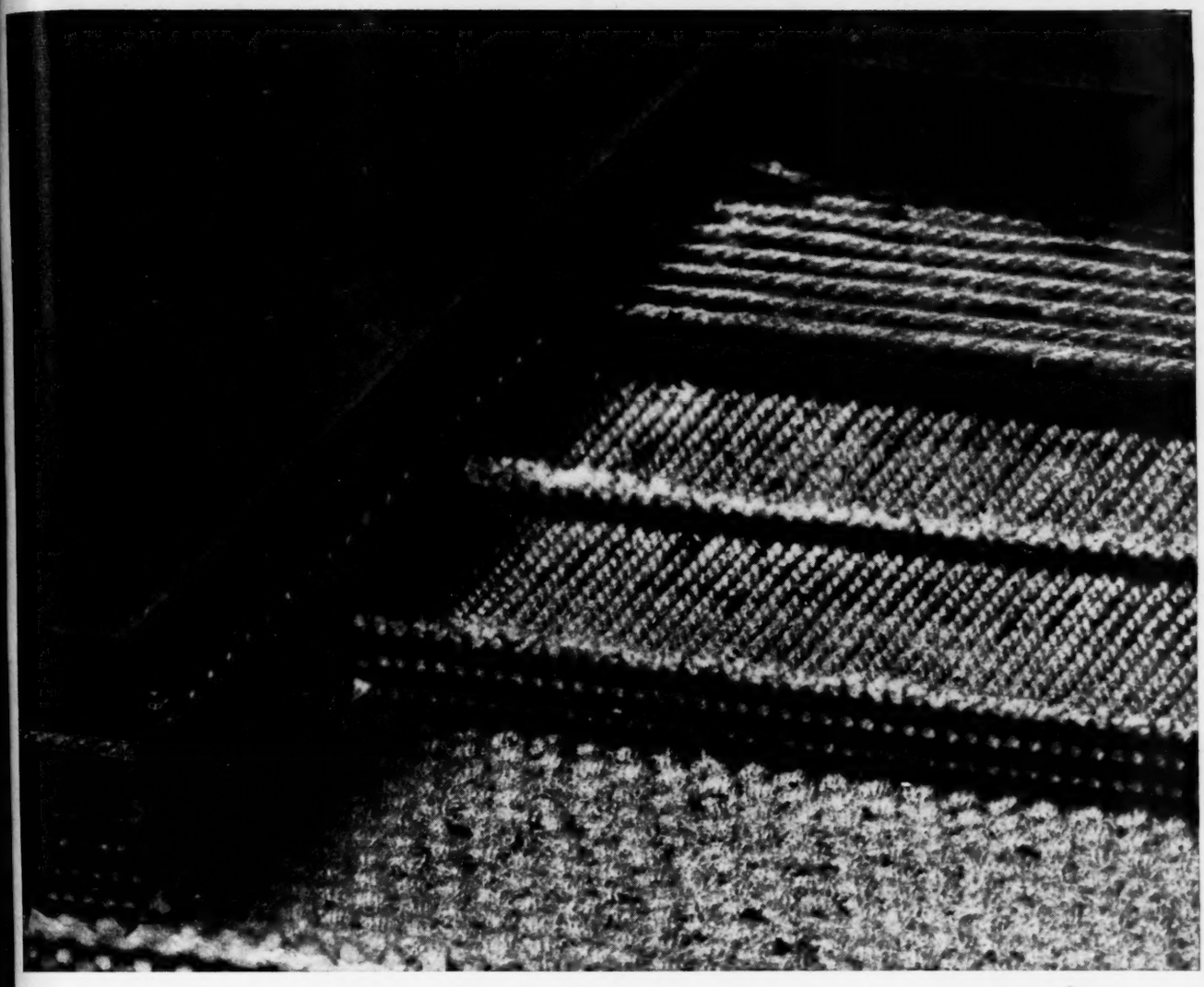
This is only one of hundreds of cases where SUN "Doctors of Industry" and SUN Mine Lubricants are helping to get out the coal so vital to Victory. Why not talk over *your* lubrication problems with a Sun Lubrication Engineer? Such a discussion may lead to a permanent solution that will help you to serve America still better. Write to

SUN OIL COMPANY, *Philadelphia*

Sun Oil Company, Limited, Toronto, Canada

SUNOCO

SUN PETROLEUM PRODUCTS *HELPING INDUSTRY HELP AMERICA*

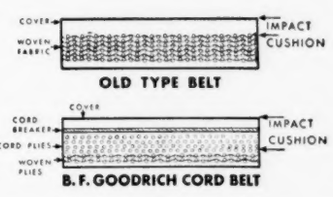


How B. F. Goodrich cord belts may help you save rubber

UNDER current rubber restrictions B. F. Goodrich *cord* conveyor belts may help save rubber and at the same time save your own trouble and time.

Belt cover thicknesses are now limited, skim coats of rubber between plies have been prohibited in most grades. So the cushioning quality of ordinary belts is now greatly reduced; but cord belts are almost the same as ever—because a cord ply has nearly the same cushioning quality as a rubber cover.

Not everyone can get cord belts, but a special effort should be made *when belts have to stand severe impact.* They'll last so much longer they'll save the rubber needed for many replacements. Use this B. F. Goodrich belt for the hard jobs; ordinary belts for the lighter, routine jobs—and the rubber-saving program will really work at its best.



Cord plies absorb heavy blows because cords imbedded in rubber, without cross strands, can spread apart under impact. Each ply adds cushion—and impact resistance in belts varies as the *square* of the cushion depth. The diagram shows how cord belts increase this cushion, why they'll last so much longer in any severe service.

If you're buying conveyor belting now or soon, find out if you can get these B. F. Goodrich belts. Any B. F. Goodrich distributor can give you full information. Most distributors can give other rubber-saving service too (salvaging worn belts, repairing and splicing with portable electric vulcanizers). Call the one nearest you or write to *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F. Goodrich

FIRST IN RUBBER


92%★ COUNT O
HULBURT
QUALITY GREASE
HULBURT

T ON HULBURT QUALITY

92% of the 25 largest coal companies east of the Mississippi River use Hulburt Quality Grease. That record was established by doing one job and one job alone — making quality lubricants for coal mine equipment. Hulburt Quality Grease is the only lubricant made exclusively for coal mine equipment. Write for your down-in-the-mine survey today.

HULBURT OIL & GREASE COMPANY

Specialists in Coal Mine Lubrication

PHILADELPHIA . . . PENNSYLVANIA

T QUALITY GREASE

COAL AGE

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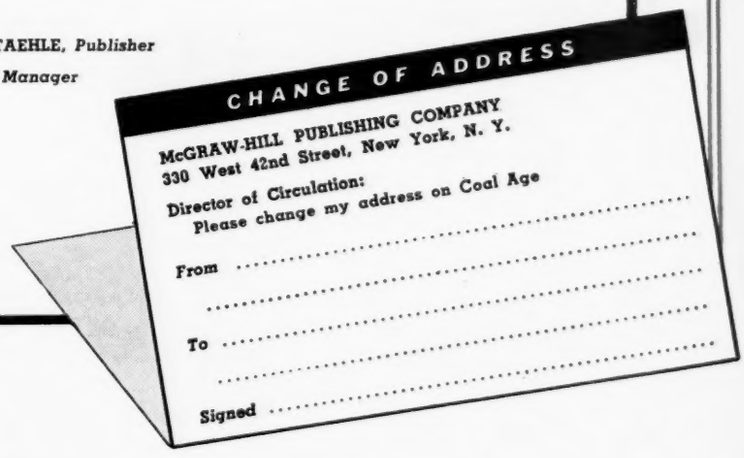


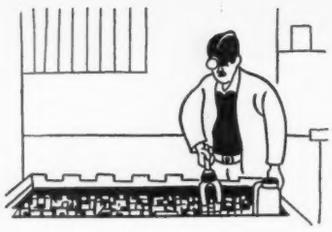
COMING ATTRACTIONS IN COAL AGE

• One of the outstanding preparation plants of the country is the subject of a detailed article scheduled for early publication. This is the new central plant of the Consolidation Coal Co., Jenkins, Ky. In addition to washing for 5x$\frac{3}{8}$ and air-cleaning minus for $\frac{3}{8}$, other modern features include complete and flexible raw-coal blending, automatic quickly adjustable equipment for exact final blending of stoker and nut-slack sizes, and complete dust-handling facilities.

• The new Coal Mountain operation of the Red Jacket Coal Corp., in Wyoming County, also will be starred in an early Coal Age. The article will include data on design and construction, including the townsite, and on the mechanical-mining methods employed.

• Shops, now that the war is being felt more in coal mining, are looming larger in operator thinking. The Superior Coal Co. has built a new machine shop to serve its four mines at Gillespie, Ill., with complete tools and facilities, including welding and metallizing units. The details are scheduled for early publication.

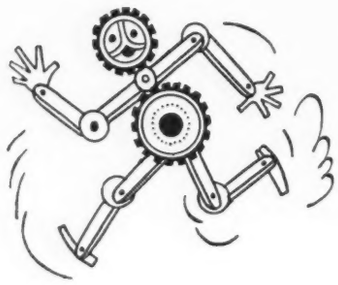
• More coal is now the cry, and how to stimulate output is now an even greater concern of miners, operators and government. Cooperative work includes "Victory Production Committees," and Coal Age has arranged for a description of how they work in one major field. Look for it in an early issue.



POWER TO CARRY ON

Equipment Saver! Because they can be charged directly from the d-c line, alkaline batteries save motor-generator equipment. Faster charging means, too, that fewer charging circuits are needed.

They Learn Quicker! Your shop's no different. There are many new men in the electrical departments of all mines. But maintenance of an alkaline battery is readily learned because the requirements are simpler, the hazards fewer. It's a man-power factor worth remembering.



Increased Mechanization! Increased underground mechanization automatically calls for improved haulage, if production efficiency is to be consolidated. That's why alkaline batteries are a good buy in war or peace. Their suitability to the job and their reliability in performance are perfect allies of modern equipment.

Edison Storage Battery Division
Thomas A. Edison, Inc.
WEST ORANGE, N. J.

The ability of a mine to produce is in great part dependent upon the adequacy of the haulage equipment—to get what is below the ground above the ground. When haulage units are powered with alkaline batteries, production capacity grows in two ways.

First, the dependability of the alkaline battery provides haulage subject to less threat of interruption—therefore improves production. Second, the characteristics of alkaline batteries are such that they provide more available power to the mine. Alkaline batteries can be charged rapidly—in 6 to 7 hours, and without equalizing. This means they can be fully charged in off-peak hours—that you can charge when you are not hoisting, therefore, can avoid adding the haulage load to the hoisting load.

MINING NEEDS THE DEPENDABILITY OF

Edison Alkaline BATTERIES

Protection for those hands as COALMASTER TOOLS speed drilling

Minimizes hazard of drilling with hand-held electric drill

This safety type of auger drill coupling, "buttons" to the drill socket in a positive fashion. There are no projectors or irregular-shaped parts to catch the driller's glove. It can be readily uncoupled.

Prevents injuries in operating post mounted drills.

Our Revolving Sleeve Safety Socket is shaped to the grip of the hand. Workers grab it and not the thread bar or socket while it is turning. The drill socket turns inside the sleeve while the thread bar is in motion.

Alignment of these tools is accurate from thread bar to tool point. That means COALMASTER TOOLS run smoothly and give workers time to relax while the drill does the work. The safety angle is one of the things that appeals to drillers. Mines are doing their fastest drilling since they standardized on COALMASTER. The coal is broken and chipped out, not pulverized.

Among the important benefits you will find are:—the breaking action works faster—you eliminate coring—there is less vibration — you don't experience costly auger bit breakage—power costs you less —auger wear is minimized—you ease the burden on the men who run your drills —you drill straight holes without choking and thoroughly clean them without scraping.

COALMASTER is made in sizes to drill correct holes for all powder, CARDOX, AIRDOX, Hydraulic and special requirements.

Eliminates finger injuries when driller uncouples auger.

The HEXANSPEED Auger Coupling operates without need of nails, cotters, or hammers. The augers are merely pressed together to couple automatically. To uncouple only a plier-type handtool is needed. No accidents as in old way when driller chisels off cotter pins or nails that hold augers together.

COALMASTER

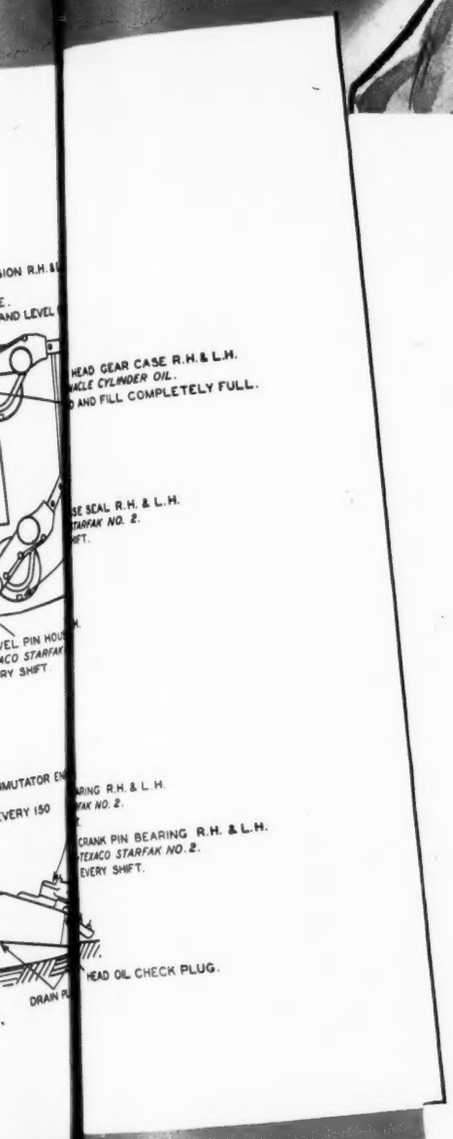
BLAST HOLE DRILLING Tools

• A COALMASTER Matched Set is a set of tools complete from drill to drill point. Each item in the set is designed to coordinate with other tools in the set and collectively do a specific type of drilling job exceedingly well.

Our representatives are drilling specialists—men trained by experience to select the tools that will meet your particular requirements best. They are all anxious to help you solve your drilling problems, centering upon the final objective of mining coal at minimum cost.

CENTRAL MINE EQUIPMENT CO.
ST. LOUIS, MO.

N CHARTS
er Tonnage



TO MEET the U. S. Government's 1943 tonnage figures, every piece of mechanized coal-mining equipment will have to be kept on the job. To do this, it will need proper lubrication.

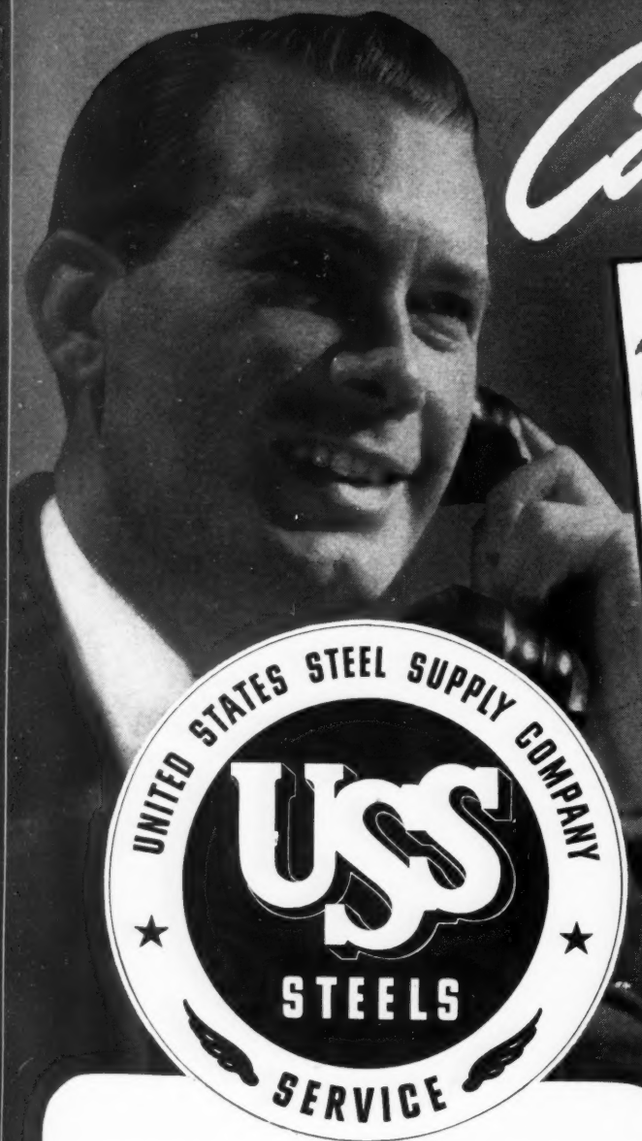
As a practical aid to the selection and application of lubricants for cutters, loaders, locomotives, we present *Texaco Maintenance Lubrication Charts.*

Produced in cooperation with the engineering staffs of promiment equipment makers, Texaco Lubrication Charts (12″x18″ in size) show at a glance exactly *where, when* and with *what* lubricant to service each and every lubrication point of your underground mining machinery . . . with lubricants approved by the manufacturer.

Texaco Charts displayed at all lubricating stations will assure maximum service life, less time out for repairs, greater tonnage. Order by make and model from—

The Texas Company, *National Sales Division, Dept. C,* 135 East 42nd Street, New York, N. Y.

Lubricants FOR THE COAL MINING INDUSTRY



Call us

for GENERAL PURPOSE STEELS

Steel products, tools, machinery and equipment

Like yours, our first job is to speed war production. So, if your production on a war job is in danger of being slowed down for want of some piece of steel—call our nearest warehouse. Many such calls have kept wheels turning.

Although our stocks are not what we wish they were, what we have can be yours—in a hurry—subject, of course, to priority restrictions.

If we don't have what you need, we'll do everything we can to help you find a source of supply. So try us—note our phone and teletype numbers below, at the left.

for NATIONAL EMERGENCY ALLOY STEELS

These new alloy steels were developed as substitutes for the old style alloy steels to save critical materials such as nickel and chromium. They cover a wide range of properties—were especially designed to meet present conditions. In fact, many "NE" steels are actually out-performing the steels previously used.

We welcome your inquiries and will gladly assist you in determining the grades best suited to your needs. Telephone, write or wire the warehouse nearest you.

for BERGSTROM *Free Flowing* HARD SURFACING ELECTRODES

If you operate any equipment on which some surfaces are subject to extra wear, you can save time and money by hard surfacing such areas. Scores of satisfied users have reported great success with Bergstrom Hard Surfacing Electrodes. Give maximum wear resistance. Easily applied in any position. AC or DC, with freedom from porosity. Six types—each designed to do a specific job.

WRITE FOR FREE INFORMATION

UNITED STATES STEEL SUPPLY COMPANY

USS STEELS

SERVICE

CHICAGO	BRUnswick 2000
Teletype CG. 605	
BALTIMORE	GILmore 3100
BOSTON	STAdium 9400
Teletype BRTN. 10	
CLEVELAND	HEnderson 5750
Teletype CV. 153	
PITTSBURGH	CEdar 7780
Teletype PG. 475	
ST. LOUIS	MAin 5235
TWIN CITY - St. Paul, Minn.	NEstor 2821
Teletype STP. 154	
NEWARK, N.J.	BIgelow 3-5920
BErgen 3-1614 -	REctor 2-6560
Teletype NK. 74	

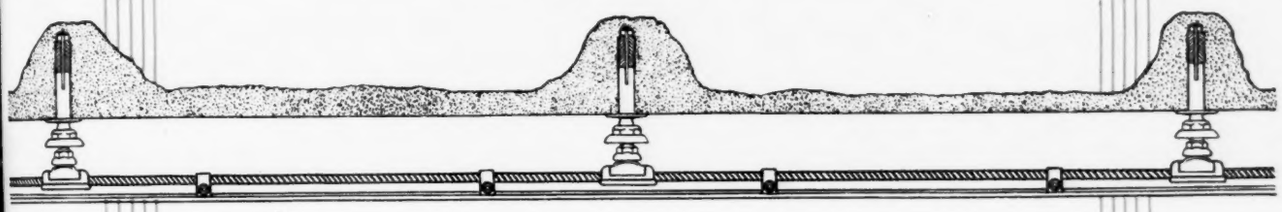
UNITED STATES STEEL SUPPLY COMPANY

(formerly Scully Steel Products Company)

UNITED STATES STEEL

Let O-B Flexible Construction*

BRING THESE ADVANTAGES TO YOUR MINE OVERHEAD SYSTEM



No "Hard" Spots In Wire

Minimizes harmful arcing and burning; stops collector hammering.

Greater Service Life

Less wear to trolley wire, overhead fittings and current collectors.

Longer Span Lengths—Fewer Hangers

Span lengths may be doubled cutting hanger installation costs in two.

Faster Haulage Speeds

Move more coal faster. With smooth underrun, trips can be speeded to meet today's increased production quotas without danger of dewirement.

Less Maintenance

Trolley wire able to "run" and hold tensions longer, keep better alignment. Fewer materials to wear.

Permanent Undisturbed Feeder Taps

Eliminates frequent feeder taps to rigid trolley wire, often source of high resistance.

Lower Installation Costs

Half as many hangers to install. Except for extremely heavy loads, messenger-feeder cable supplies sufficient current eliminating separate feeder installation costs. If necessary, wide variety of fittings are available to install auxiliary feeder from same hangers.

Planning the rehabilitation of old overhead or the installation of new to serve extended workings? Then write today sending us plans of your proposed system. We'll be glad to show you how O-B Flexible Construction* can be incorporated into your design, putting these time and money saving advantages to work for you. No obligation, of course.

* A means of introducing resiliency into mine overhead construction. With this method, the trolley wire is freely suspended by staggered supports from a messenger-feeder cable, which, in turn, is rigidly attached to the mine roof. Wire alignment at curves may be handled by Combination Feeder and Trolley Wire Clamps.

2370-M

★ BUY WAR BONDS ★ ★ ★ ★ ★ ★

Ohio Brass

MANSFIELD, OHIO

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Wanted— More Synergism!

"What is Synergism?" you well may ask. To put it succinctly, you might say that synergism is the force that can make 2 + 2 = 5.

Synergism is not a new word. It has its roots in the classic Greek (Συν—together; Εργον—work) and has long had its connotations for the chemist, the doctor and the theologian. Basically, it always has meant forces working together to produce a whole greater than the sum of the parts.

Now, "Synergism" emerges, in its larger sense, with a meaning for industry, bred of war accomplishment.

For the miracles of war production are in no small part due to the meeting of minds, working together as a creative stimulus—minds that "click," as we call it on the street—so that the net result is always greater than the sum total of the individual ideas. From synergistic thinking, evolve the great mechanisms, the new synthetics, the magnificent product creations which comprise materiel for Victory.

Synergism may apply to individuals working together, to groups, to companies—across a table, in the laboratory, in the field. It is the newer concept for industrial mentality. Now, as never before, it is evident that industrial progress revolves about the stimulus created by minds working together to "click" creatively. Synergism is a much needed component for post-war development—not as an abstract philosophy, but as a practical working force.

Here at Atlas, we are "Synergism-minded." In our own fields of chemical endeavor, we have acquired a degree of expertness which can be applied synergistically to products now to create results far beyond present design expectations. Add synergism to cooperation and miracles become commonplace.

We would like to talk with you.

ATLAS POWDER COMPANY
WILMINGTON, DELAWARE

Offices in Principal Cities

Industrial Explosives • Industrial Finishes • Coated Fabrics • Acids
Activated Carbons • Industrial Chemicals • Ordnance Materiel

Simple, SYSTEMATIC DRIFTER LUBRICATION CUTS REPAIRS, BOOSTS FOOTAGE

A FEW MINUTES A DAY AND A LITTLE OIL WILL HELP YOU MEET WAR-TIME NEEDS

Regular lubrication is a vital factor in the performance and service given by any drifter drill. It is particularly important today when the war effort and the scarcity of strategic materials demand the conservation of every piece of drilling equipment.

Here are four simple lubrication suggestions which will help you get the most out of your CP Drifters. While these suggestions apply particularly to CP MOTORdrifters they are applicable generally to other models. Detailed recommendations on hand-cranked CP Drifters will appear in future advertisements.

HOW TO GET MAXIMUM SERVICE FROM YOUR CP DRIFTER DRILLS

1 Twice each shift, fill the drifter oil reservoir with a good grade of rock drill oil.

2 Be sure to keep the motor feed oil reservoir filled with good grade of rock drill oil.

3 Check the feed screw frequently. Keep an oil can handy, oil feed screw occasionally.

4 Before operating drifter, turn on air and make sure oil is blowing through exhaust.

★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL CP COMPANY
General Offices: 8 East 44th Street, New York, N. Y.

★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

HE'S A MIGHTY IMPORTANT MAN RIGHT NOW!

help him keep 'em running

Are your locomotives getting the attention they need—WHEN and WHERE they need it—to insure maximum tonnage? Your inspection and maintenance man holds the answer.

Anything *you* can do now to help him save time and do a more thorough job will help to save expensive repairs and lost tonnage later on.

The Westinghouse Time-Saver is specially designed for such men. No frills—just straight down-to-earth inspection and operating suggestions. Help your maintenance men keep 'em running efficiently—and hold down maintenance and repair costs—by putting this material in their hands *now*. Westinghouse Electric & Mfg. Company. Plants in 25 cities...offices everywhere.

J-15075

Send Today For This INSPECTION GUIDE

OPERATING TIPS for your motormen on ways they can help *prevent* trouble.

LOCATING TROUBLE — quick checks for your maintenance men.

KEEPING RECORDS — suggestions to facilitate easy, thorough inspection.

Westinghouse

MINE LOCOMOTIVES

Westinghouse Electric & Mfg. Co.,
Dept. 7-N, East Pittsburgh, Pa.

My men can use_____copies of your Time-Saver Guide.

Company_____

Title_____

Address_____

City_____ State_____

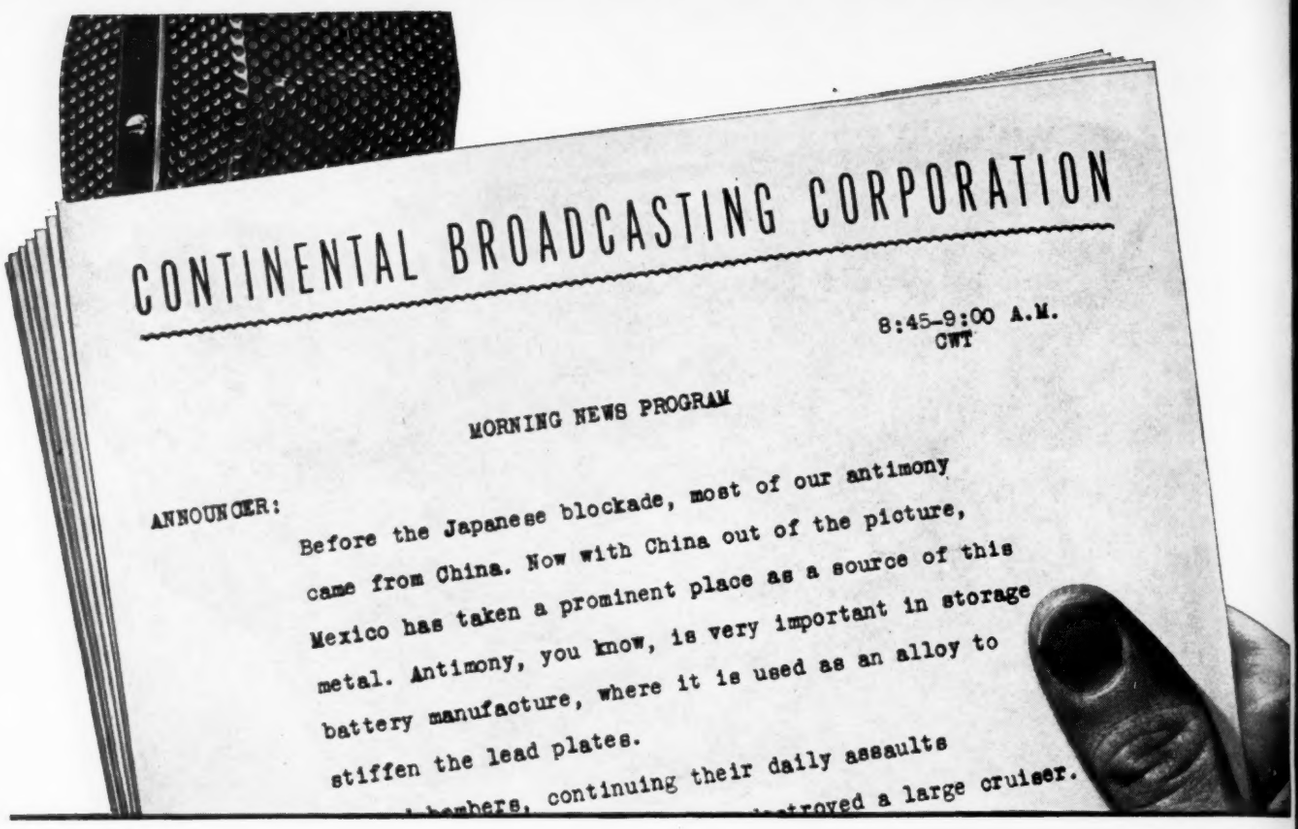


Plate stamina is still "pre-war" in GOULD KATHANODE—your best choice for shuttle cars and locomotives

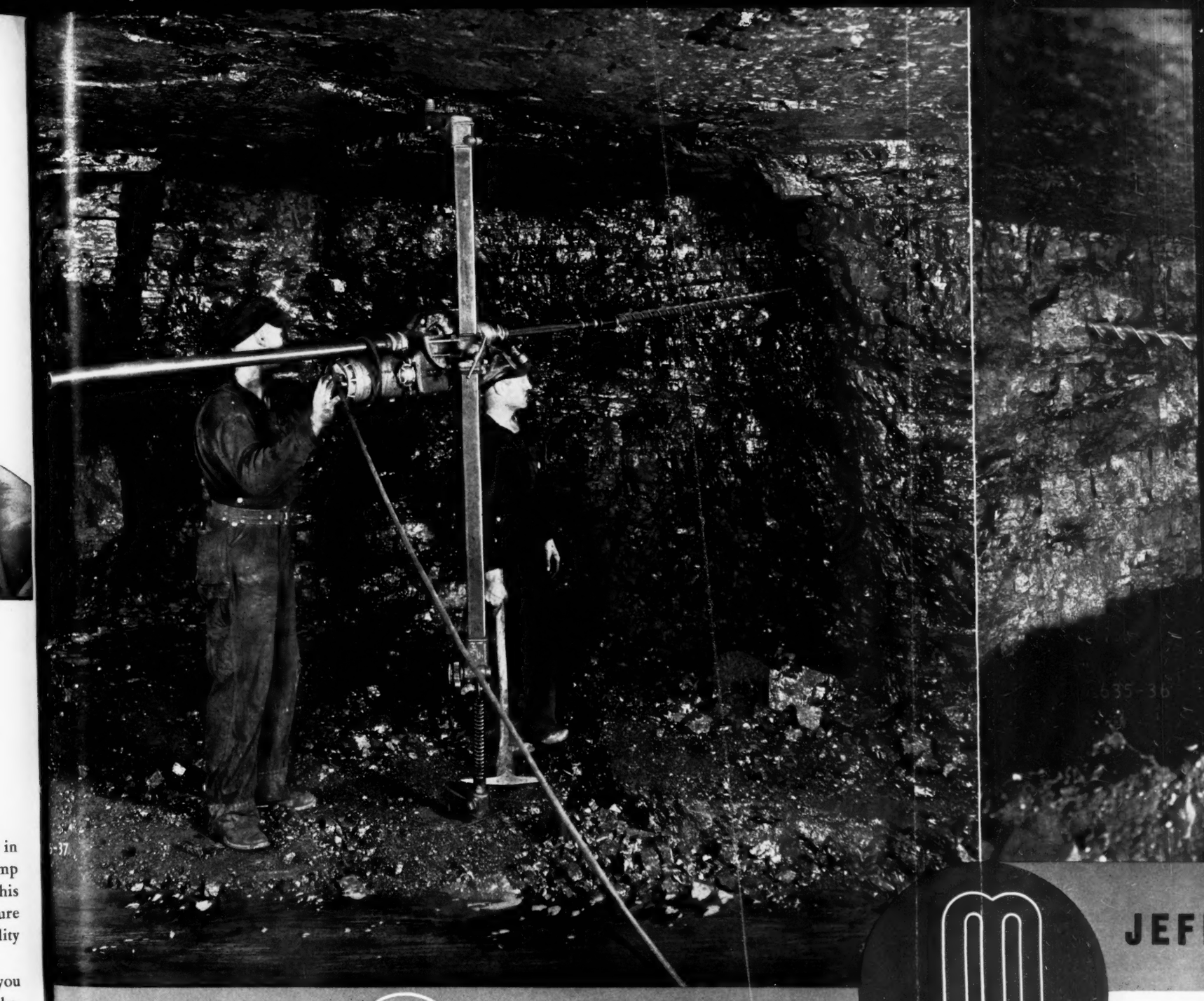
RATED CONSERVATIVELY—Goulds will equal or exceed in capacity any battery of comparable size and cell structure. Buy on proven performance and you will buy Gould!

WITHOUT antimony to stiffen them, the lead grids in Gould Kathanode—or any battery—would be as limp as fresh bread. The Gould factory is getting all of this vital metal it requires—another reason you can be sure that the Gould you buy today is the same high quality battery as always.

New batteries are available—but don't buy unless you have to! Get the most out of your present Gould Kathanode. Its spun glass construction introduced by Gould to American industry doubles battery life—which means that Gould Kathanode will last twice as long as ordinary batteries lacking this feature.

FREE HELP ON BATTERY PROBLEMS—*Your Gould Service Man will help you get full service from your present equipment, regardless of make. No charge, no obligation. Write Gould Storage Battery Corp., Depew, N. Y. Ask for FREE descriptive literature on any type of industrial installation.*

GOULD THE BATTERY PICKED BY ENGINEERS



JEFFREY A·6 POST DRILL

Properly placed shot holes save powder — make better lump — help the roof. The A-6 drill is light in weight — drills shot holes with ease and speed. Anti-friction bearings . . . long life and low maintenance. Open or permissible types.

• • •

Also 56-A track-type self-propelled drilling machine available with one or two drills each mounted on an easily adjustable supporting arm that permits rapid drilling anywhere in the coal face.

JEF

A L W

Drilling service

to place. Tota

able for prote

switch. Built to

JEFFREY A·7 HAND HELD DRILLS

ALWAYS READY FOR SERVICE

Drilling service at your fingertips. No time lost in setting up or transporting from place to place. Totally enclosed construction — anti-friction bearings — safety clutch available for protection of operator. Specially designed quick break trigger-operated switch. Built to withstand the hard knocks. Open or permissible types.

LS

JEFFREY
EQUIPMENT for MECHANIZED MINING

LOADERS
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DRILLS
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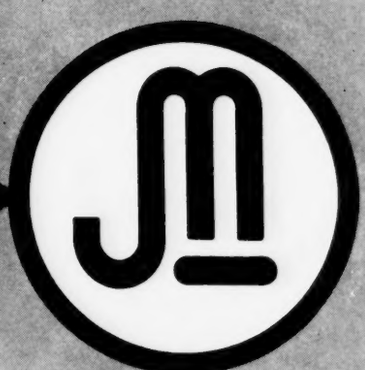
RENEWAL PARTS



BELOW AND ABOVE GROUND
FROM FACE TO RAILROAD CAR

Y

or

NING

ROUND

D CAR

MAINTENANCE HINTS FOR DRILLS

To get continuity of service and maximum production from your drills, with the least time out for repairs:

1. KEEP THE DRILL CLEAN

Wipe off accumulations of grease, dust or moisture from outside frames and exposed moving parts every day. Always stand drill up or hang it up when not in use and lay it down only in a dry place.

Moving parts exposed to dust should be occasionally lubricated with a light oil, not with grease.

Keep commutators and brush holders clean; the former free from grease, the brushes operating freely in the holders. Look inside motor frame occasionally — remove accumulations of dirt or grease. If found — remove cause. Take good care of your drill cable and keep proper size fuses in the circuit.

2. MAKE SCHEDULED INSPECTIONS

See that switch makes good contact. Check electrical connections to see that they are tight.

Do not allow drill to operate with screws, bolts or cover plates removed.

Remove rough spots on feed screws to avoid rapid wear of feed nuts.

3. LUBRICATE AT REGULAR INTERVALS

Use proper lubricant in bearings and gear case and be careful not to overfill the gear case as too much lubricant will cause overheating and excessive load on the motor.

4. DO NOT OVERLOAD YOUR DRILL

See that friction clutch is not set too tight and do not allow drill to run very long with a slipping clutch. Use the clutch as a relief for overload and a protection for the motor and gearing as intended. Drilling with dulled bits unnecessarily overloads the motor and reduces efficiency.

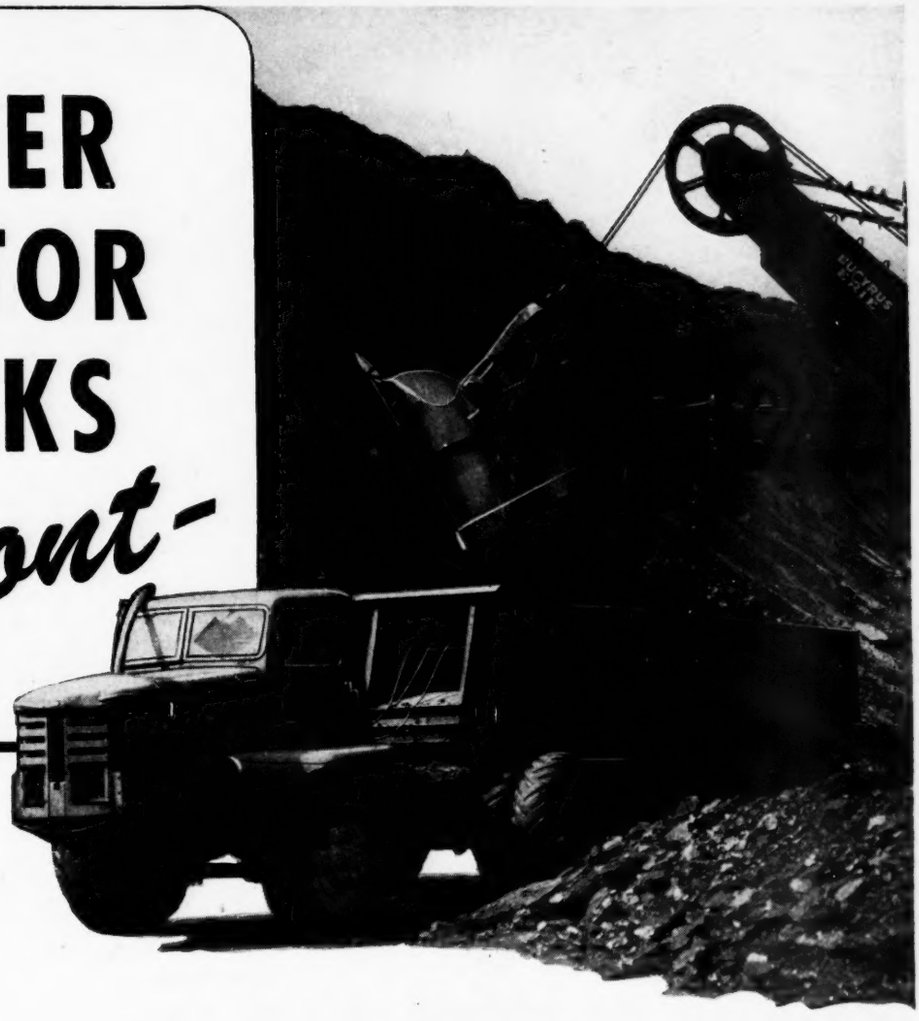
THE JEFFREY MANUFACTURING COMPANY

912-99 North Fourth Street, Columbus, Ohio

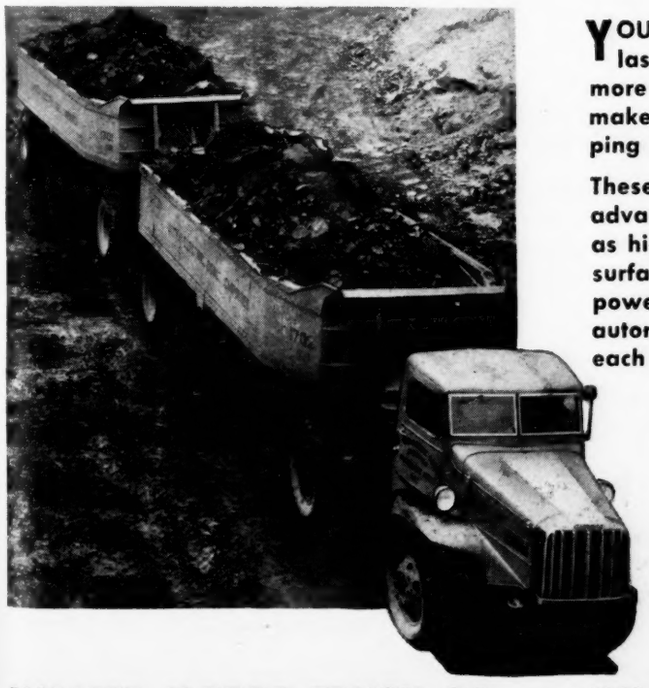
Sales Offices: Baltimore, Birmingham, Boston, Buffalo, Chicago, Cleveland, Cincinnati, Detroit, Denver, Harlan, Houston, Huntington, Milwaukee, New York, Philadelphia, Pittsburgh, Scranton, St. Louis, Salt Lake City

Service Stations: Pittsburgh, Harlan, Ky., Birmingham, St. Louis, Logan-Beckley, W. Va., Scranton

WALTER TRACTOR TRUCKS *up front-*



-Keep coal quotas from lagging behind!



YOU probably strained your facilities to the limit meeting last year's record coal tonnage. Now—40,000,000 tons more are required in 1943. To fulfill this enlarged quota, make sure your hauling capacity keeps pace with your stripping capacity . . . by using WALTER TRACTOR TRUCKS.

These giant Walter units embody 4-Point Positive Drive—an advanced four-wheel drive with power-plus-traction to haul as high as 55 ton payloads unfailingly over soft or slippery surfaces, up steep grades, around sharp curves. The full power of its 175 h.p. Diesel engine is delivered by three automatic lock differentials, which proportion the torque to each wheel according to its traction at any moment.

Other features which assure safe, easy handling under all running conditions, are Suspended Double Reduction Drive for greater gear capacity, higher ground clearance and minimum unsprung weight; 14 - to - 1 range Tractor Type Transmission with 6 speeds forward, 2 reverse, fast high gear and powerful low gear; heavy duty internal brakes; and many more. Write for detailed literature.

WALTER MOTOR TRUCK CO. • 1001-19 IRVING AVE., RIDGEWOOD, QUEENS, L. I., N. Y.


TEAMED U
4
"Blue Center"
STEEL WIRE ROPE
Electrical
WIRE AND CABLE
JR
ROEBLING
ROEBLING

UP to float Victory ships *Faster!*

LOOK AT THE FRONTS America is fighting on . . . and you'll see why more than a million tons of new ships a month *is not enough!* Watch a three-story prefabricated deck house being swung into place . . . and you'll see why the 8-day keel-to-launching record *will be broken again!*

For this breath-taking and Axis-shaking production, we can thank American teamwork. Teamwork of shipbuilders and their three-quarter million workers . . . teamwork of far-sighted organization and tradition-shattering techniques. Yes, and teamwork of many products, too—playing a coordinated part.

Roebling "Blue Center" Steel Wire Rope and *Roebling Electrical Wire and Cable* . . . miles and miles of them are teamed up, working side by side.

On the ways . . . Wire Rope rigs the whirley cranes that position 75 tons and 10,000 man-hours of steel work with one sweep of the booms . . . Electrical Cable feeds the welding arc that sew up steel sheets into stiffeners and bulkheads and bow sections.

At launchings . . . Wire Rope holds the reining lines that guide these ships down the ways . . . Electrical Wire passes along the word "go" from keel greaser to dock foreman to yard superintendent.

And in the ships themselves . . . Wire Ropes on topping lifts and cargo falls and slings help these cargo ships pay off at distant ports . . . Electrical Wires turn the motors and light the quarters and give voice to the radio shack.

It took *new skills* to build these ships . . . and to draw and spin and lay their wire rope sinews . . . skills that are going into today's "Blue Center" to make it meet conditions unfailingly wherever wire rope has a job to do.

It took *new knowledge* of wartime service conditions . . . and of building toughness into conductors and insulations and coverings . . . knowledge that is passed along to you in every inch of Roebling Electrical Wire and Cable.

And the nearest Roebling office or Roebling Distributor is ready to get this *Teamwork* on the job for you. Bringing the experience of putting wire to work in a hundred industries . . . and the results of learning every day to make Roebling Wire Products better than ever before.

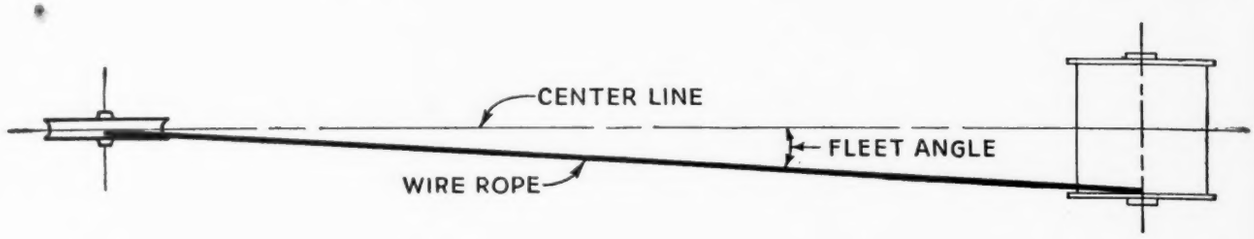
JOHN A. ROEBLING'S SONS COMPANY

TRENTON, NEW JERSEY *Branches and Warehouses in Principal Cities*

Pacemaker in Wire Products

Keep fleet angles under 3 deg.

for best service from wire rope



The "fleet angle," illustrated above, is an important consideration when locating a main sheave in reference to a winding drum. If this angle is too large, there will inevitably be side-wear on the rope as it passes diagonally from the outside edge of the drum across the sheave.

Experience has shown that best results are obtained when the fleet angle is not greater than 1½ deg., with a smooth-faced drum, and not greater than 2 deg. with a grooved drum. When the fleet angle exceeds a maximum of 3 deg., wire rope service life is materially reduced. If these recommended fleet angles are followed, you will get a lot of extra service from wire rope.

Another worth-while maintenance precaution is proper alignment of sheaves. Proper sheave alignment seems like such a small matter that it may be overlooked in busy times—yet it can add greatly to wire rope service life.

To line up two sheaves properly, simply adjust them so that the rope runs straight from one to another and seats squarely in the center of each sheave groove. Even a slight misalignment can cause a great deal of wear between the rope and the shoulder of the sheave.

On certain types of work it is well to check sheave alignment from time to time during operation, to catch and correct any deviation from true alignment. For example, on timber-mounted drag-scrapers and slack-line excavators, the sheaves are apt to slip out of alignment due to a loosening of the mounting in the wood.

Mining machines—loaders, slushers and tugger hoists—should also be frequently inspected. Wire rope that operates in a mine is subject to severe wear under the best of conditions. Help the rope with maintenance precautions, wherever possible.

A third practical suggestion is to inspect the wire-rope system of clam-shell buckets for wobbly sheaves and to replace worn sheave bearings or worn axles where necessary. A wobbly sheave, or a badly worn sheave, can greatly reduce the service life of a wire rope.

Bethlehem Wire Ropes for all Purposes

BETHLEHEM STEEL COMPANY

CORRECT EXPLOSIVES—

Just as Important Here as They are Here

Millions of tons of coal must be shot and mined before guns or ammunition can be manufactured. We at National appreciate the job you coal miners are up against to meet the unprecedented war-time demands. So we are devoting all our skill and efforts to mine explosives, with the result that National now supplies Permissible Powders *correct* for shooting any coal measure east of the Mississippi. Within less than one year more than 200 coal operators, anthracite and bituminous, have standardized on National permissibles.

See our complete data in Coal Mining Catalogs.

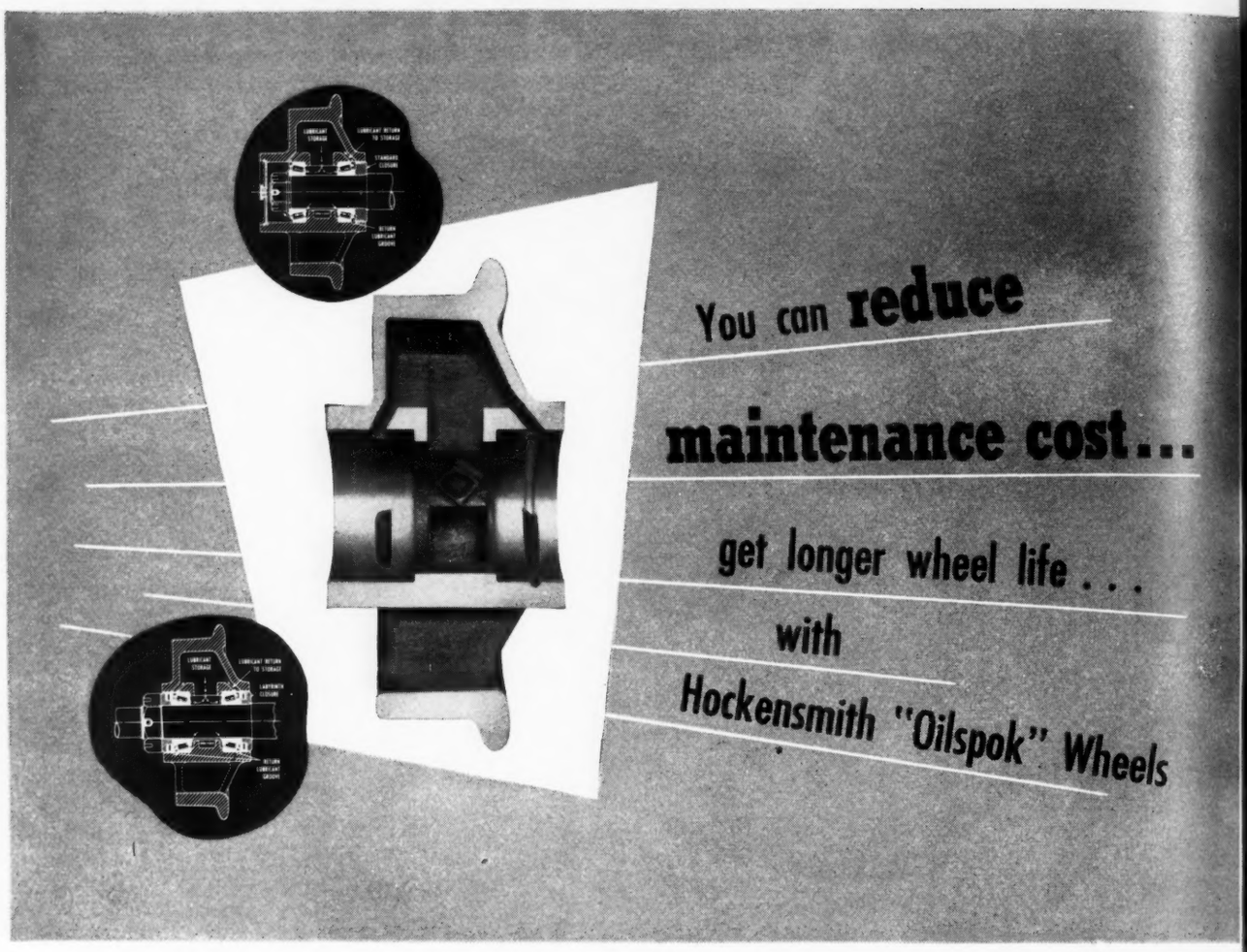
Not living on our reputation but building it.

NATIONAL POWDER COMPANY

ELDRED (McKEAN COUNTY) PENNA.

POWDER NATIONAL COMPANY

MANUFACTURERS OF HIGH EXPLOSIVES FOR ALL INDUSTRIAL PURPOSES



"Oilspok" wheels save lubricants and lubricating labor because the oil in the hollow spokes is sealed in, yet gives positive and continuous lubrication to the bearings. There is absolutely no loss due to bearing pumping pressure or air expansion. One greasing lasts several years. This distinctive feature of "Oilspok" Wheels means less maintenance cost and loss of car service.

"Oilspok" Wheels can be furnished for all mine car bearing sizes, in diameters from 10 inches to 20 inches. In addition to the standard "Oilspok" shown in the illustration, with the alternate box spoke and open design, "Oilspok" Wheels can also be made for extra heavy duty, designed with a single or double web connecting the box spokes. "Oilspok" Wheels are made for use with plain or roller bearings.

Save maintenance cost . . . get longer wheel life . . . specify Hockensmith "Oilspok" Wheels. Write for full information.

CONSTRUCTION FEATURES

CORRECT DESIGN. Hockensmith "Oilspok" wheels are designed with correct proportioning of the tread, hub, and spokes for maximum strength plus an ample margin of safety.

CAREFUL METALLURGY. Cast from a special alloy to insure deep chilling, strength, and toughness.

SKILLED MOULDING. Cast in machine chills, producing a *round* wheel and *smooth* tread—little brake skidding or rolling friction on the rail.

CONTROLLED ANNEALING. Internal strains are eliminated by carefully controlled annealing in soaking pits located in the foundry floors so wheels reach them immediately after the iron has solidified.

PRECISION MACHINING. Specially designed machines insure tread being concentric with the bore, and hubs being machined to exact limits—important steps in the manufacture of a *good* wheel.

Hockensmith
Wheel & Mine Car Company
Established 1877
PENN, PA.
Long Distance Phone, Jeannette 700

OIL IS AMMUNITION, USE IT WISELY

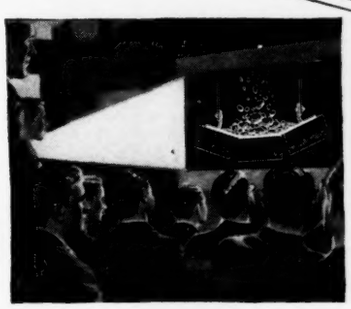
17,485

PLANT AND FIELD OPERATING MEN USE THIS MANUAL

Send for your FREE copy

YOU can get far longer life from your precious belting, hose and other rubber products by following the conservation practices recommended in this authoritative manual, prepared by the G.T.M. – Goodyear Technical Man.

More than seventeen thousand field and factory maintenance men are now using it, after seeing its rubber-saving helps demonstrated in the interesting slide film "GOODYEAR WAGES WAR ON WASTE." To have this important film shown to a group meeting at your offices, and to obtain copies of the manual for your key operating men, write Goodyear, Akron, Ohio or Los Angeles, California – or phone the nearest Goodyear Mechanical Rubber Goods Distributor. Remember many rubber products cannot be replaced – the Goodyear conservation plan will help you save them!

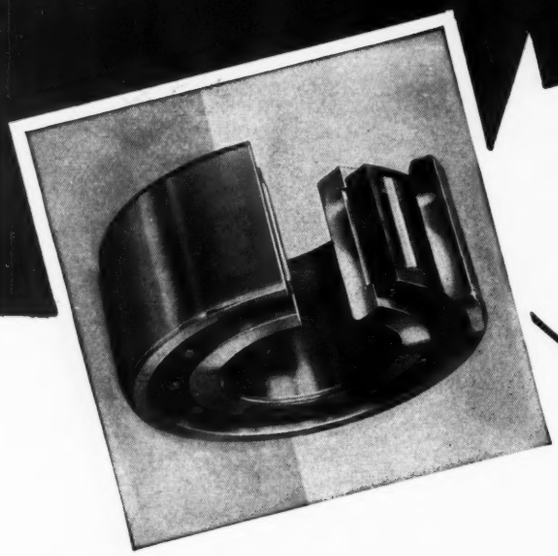


SEE HOW TO GET UP TO 50% LONGER WEAR FROM BELTS AND HOSE — *it's clearly shown in the slide film "Goodyear Wages War on Waste" — with complete instructions in the Goodyear Manual.*

GOODYEAR

THE GREATEST NAME IN RUBBER

Longer Life for Every Bearing *Because:*



All ROLLWAY RADIAL BEARINGS are Free from Thrust Loads

All ROLLWAY THRUST BEARINGS are Free from Radial Loads

PILE a thrust load on a roller bearing that's already carrying a radial load and you introduce complex stresses that tend to force the rollers from the race . . . that tend to increase sliding friction and wear-back between the roller ends and the radius of the race . . . and that tend to cause earlier fatigue failure.

That's why Rollway Solid-Cylindrical Roller Bearings split every load into its two simplest components of *pure* radial and *pure* thrust . . . carrying each of these on separate roller assemblies at RIGHT ANGLES TO THE ROLLER AXIS. Both torque per bearing and load per roller are substantially reduced. You get greater roller cross-section and greater roller contact area per unit of load, hence more strength to meet stress, and less hazard of spalling and brinelling the race.

You can usually change over from other bearings to Rollways of higher load capacities without increasing boundary dimensions. But, for maximum life and service, your bearings should be carefully chosen as to size and type. Send us your drawings, or a description of your application, for free and confidential bearing recommendation.

For longer bearing life, more efficient performance and more economical maintenance . . .

FOLLOW THIS BASIC BEARING PRINCIPLE

- All radial loads carried at right angles to the roller axis.
- All thrust loads carried at right angles to the roller axis.

ROLLWAY BEARING COMPANY, INC., SYRACUSE, N

BUILDING HEAVY-DUTY BEARINGS SINCE 1908 **BEARINGS**

CARDOX

"THE NON-EXPLOSIVE MINING METHOD"

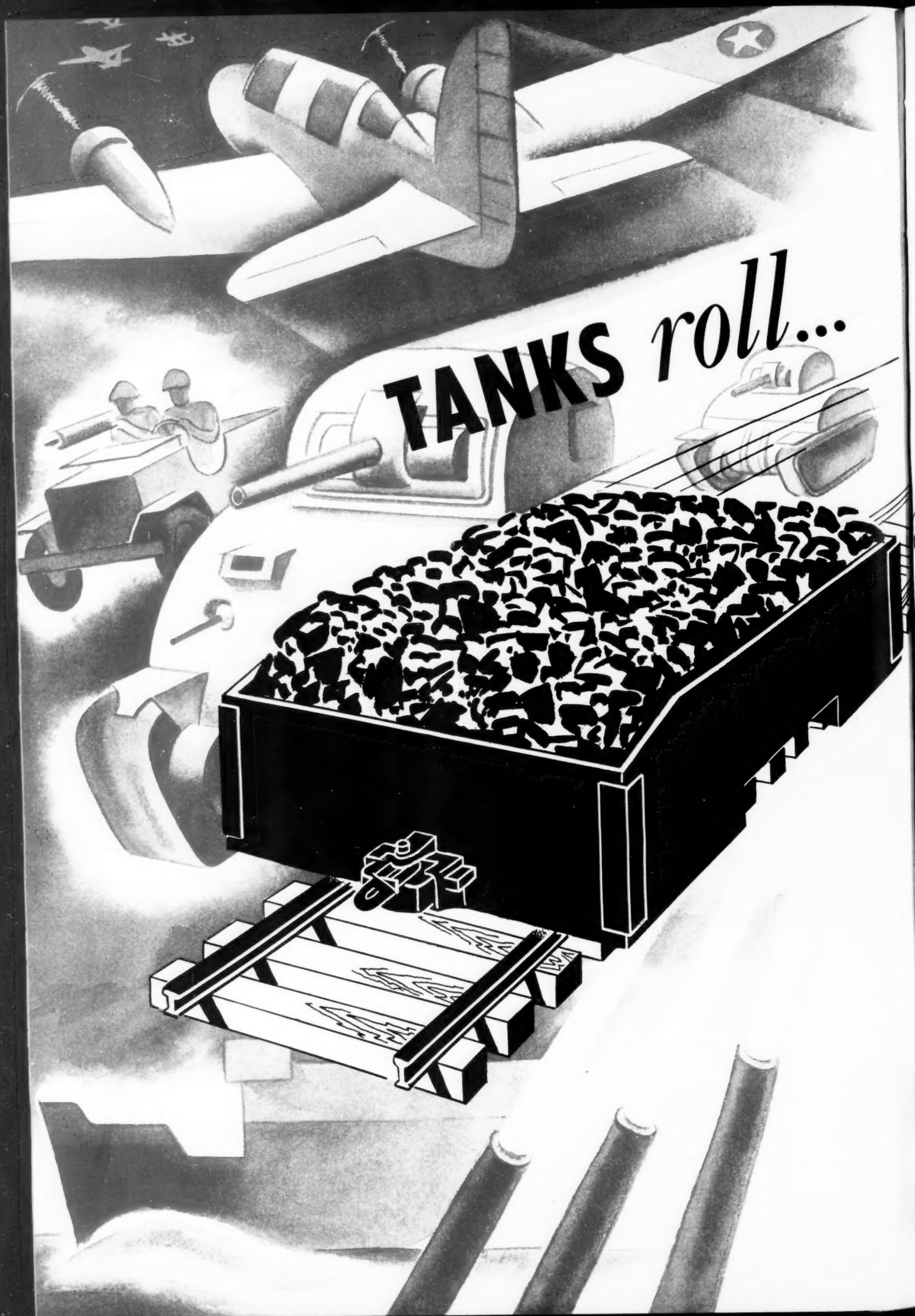
FOR *Stepping Up* PRODUCTION

UNDER WARTIME CONDITIONS

● CARDOX helps solve wartime production problems by making possible more efficient use of available men and equipment. Because CARDOX produces no smoke or noxious fumes, coal can be broken down just as fast as falls can be loaded. Loading is faster . . . with less wear and tear on mechanical loaders . . . because CARDOX rolls out the coal for easier handling. Hand digging is reduced to a minimum. Coarse sizes produced by the gentle heaving action of CARDOX make it possible to remove slate and bony bands right at the face . . . making it unnecessary to haul such waste materials to the surface.

Write or wire for details of free demonstration in your own mine that proves value of CARDOX for maintaining or increasing production schedules under wartime conditions.

CARDOX CORPORATION • Bell Building • Chicago


TANKS roll...

PLANES *soar...*

SHIPS *ply...* GUNS *roar...*

AND AMERICA ADVANCES
to the shuttling of its mine cars!

Shuttling between vein breast and tipple, the mine cars of America pour forth their precious loads of ore and coal — *power-in-the-making* — power to compel victory! Here — at the very heart of our war production — speed . . . speed . . . and more speed . . . is the order of the day!

At high mine car speeds, all plain and self-oiling wheels will wear out in the hub — no matter how carefully watched and lubricated. But modern A.C.F. trucks with anti-friction bearings will stand any war-time speed — and will give you long years of efficient post-war service at a great over-all saving.

We can supply needed A.C.F. trucks, wheels, axles, bumpers, and electrically welded end sill construction with spring bumpers. Delivery of complete cars depends upon receipt of materials.

A.C.F.

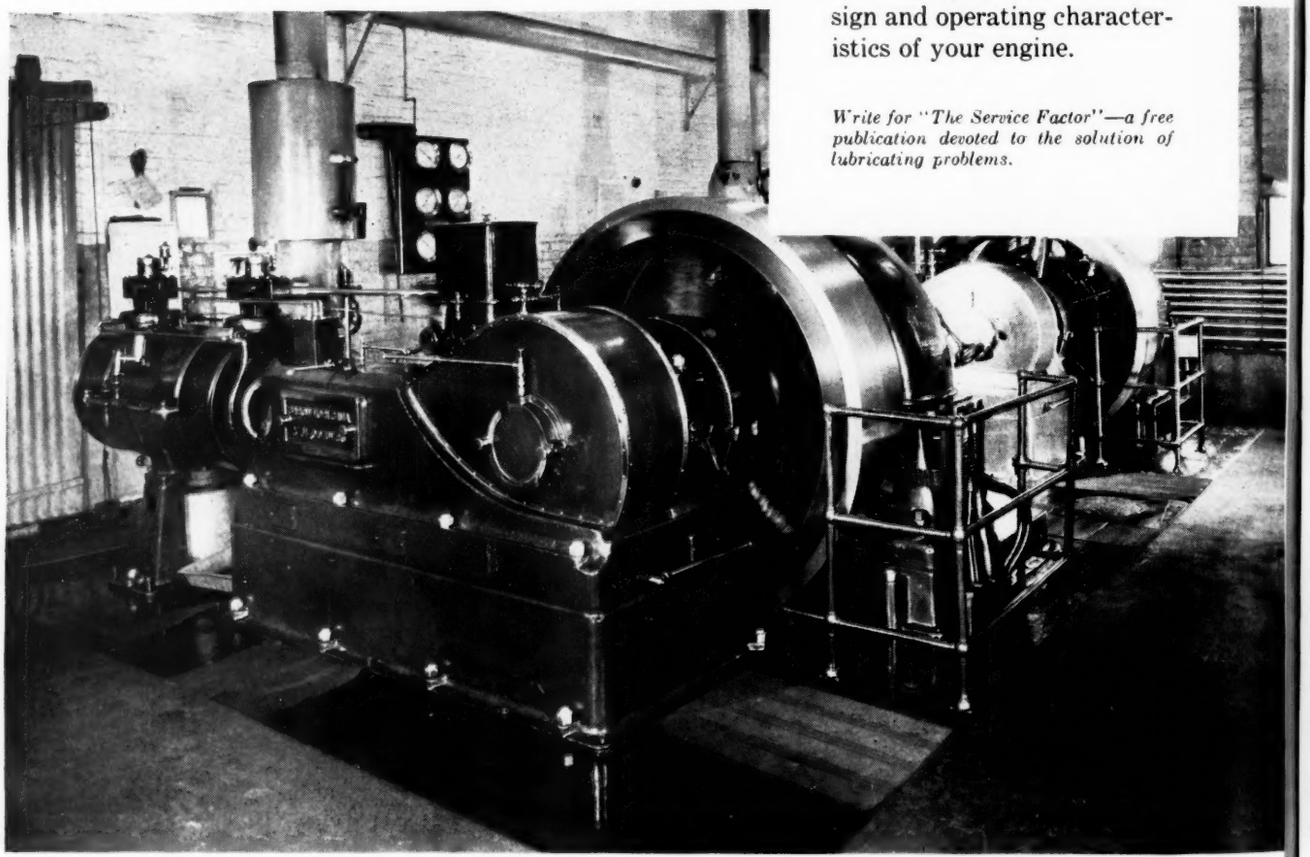
AMERICAN CAR AND FOUNDRY COMPANY

NEW YORK · ST. LOUIS · PHILADELPHIA · BERWICK, PA.
CLEVELAND · CHICAGO · PITTSBURGH · HUNTINGTON, W. VA.

FIRE POWER needs manpower — and *horsepower*. To maintain full designed *STEAM* plant horsepower use . . .

. . . SINCLAIR STEAM CYLINDER and VALVE OILS. These oils provide *correct* power house lubrication under any combination of steam conditions and steam recovery requirements. Sinclair provides oils exactly suited to the design and operating characteristics of your engine.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE NEAREST SINCLAIR OFFICE

SINCLAIR REFINING COMPANY (Inc.)

2540 West Cermak Road, Chicago · 10 West 51st Street, New York City · Rialto Bldg., Kansas City · 573 West Peachtree Street, Atlanta · Fair Building, Ft. Worth

Twelve Large Pages
Fully Illustrated
Bulletin A-371

This New Bulletin Might Easily Save You Many Hours of Precious Working Time . . .

Every experienced mining man knows how difficult it is to adjust the ropes on conical and cylindro-conical hoist drums so that each cage or skip will come in correct alignment with both the top and bottom landings. Hours, even days, of precious working time are often lost while mine mechanics try to solve this problem by cut-and-try methods—a waste which is especially regrettable at the present time when every pound of coal or ore is badly needed.

Now Vulcan offers a time-proved remedy. The new eight-page bulletin illustrated above contains simple diagrams and formulas by means of which anyone who can add, subtract, multiply and divide, can determine exactly how much to take in or let out, on each rope, for any of the nine different conditions of misalignment that may occur. It also contains complete instructions for installing ropes on any large hoist with minimum trouble and expense.

We want everyone whose responsibilities include the operation of large hoists to have a copy of this bulletin (No. A-371) and will mail it promptly on request. Tell us, also, about any other hoist troubles you may have—Vulcan engineers will be glad to give you the benefit of our 90 years' experience without charge or obligation of any kind.

VULCAN IRON WORKS
WILKES-BARRE • PENNSYLVANIA

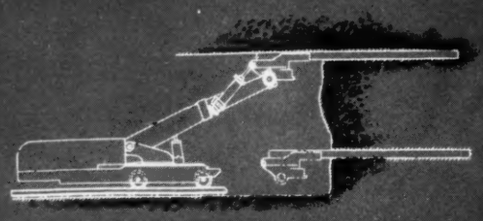
Heavy-Duty Electric Hoists
Steam Hoisting Engines
Self-Contained Hoists
Scraper Hoists
Car-Spotting Hoists
Room Hoists

Shaking-Chute Conveyors
Chain Conveyors
Sheaves, Pulleys, etc.
Cages, Skips, Gunboats
Coal-Preparation Equipment
Iron and Steel Castings

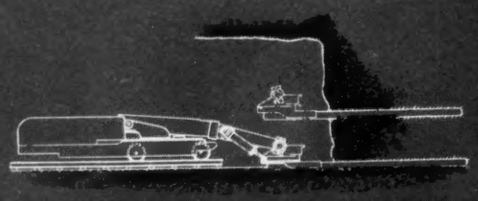
Steam Locomotives
Electric Locomotives
Diesel Locomotives
geared and electric drive
Gasoline Locomotives
geared and electric drive

Load-Carrying Larries
Rotary Kilns, Coolers and Dryers
Improved Vertical Kilns
Quick-Lime Hydrators
Ball, Rod and Tube Mills
Roasters, Calciners, Retorts, etc.

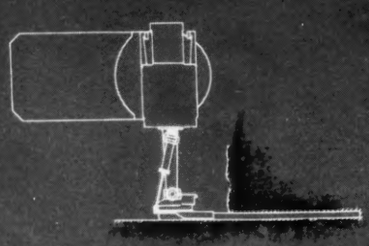
CUTTING AND L



1. Vertical range of cutting element in top cutting position.



2. Vertical range of cutting element in bottom cutting position.



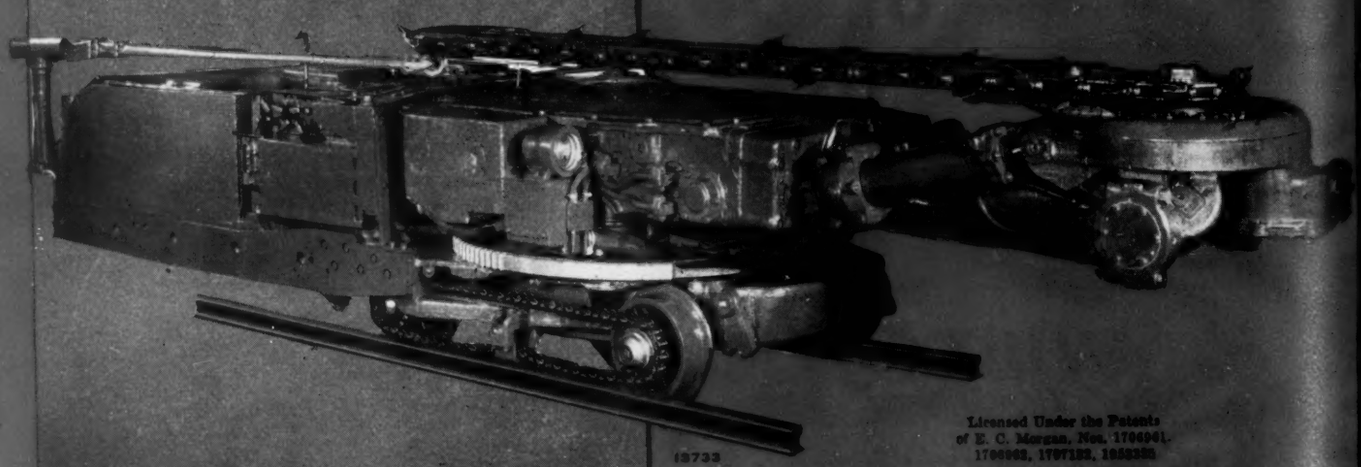
3. Cutting element in rib shearing position.

4. Cutter arm folded over machine for short tramming length.

GOODMAN 1224 SLABBER

This Goodman slabbing machine has a horizontal cutting range from 9 inches below the rail to 8 feet above, and will shear cut parallel to the track up to 9 feet on either side. Control is hydraulic.

Ask for Bulletin M-421



13733

Licensed Under the Patents of E. C. Morgan, Nos. 1706961, 1706962, 1707182, 1952328

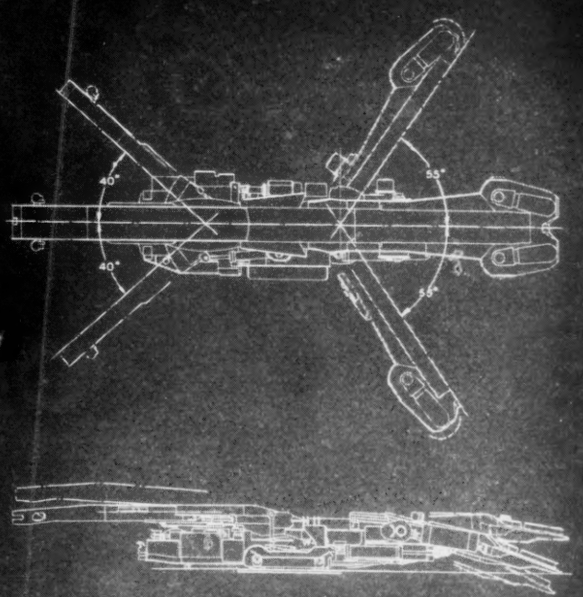
GOODMAN MANUFACTURING COMPANY

LOADING AT IT'S *Best*

GOODMAN 460 LOADER

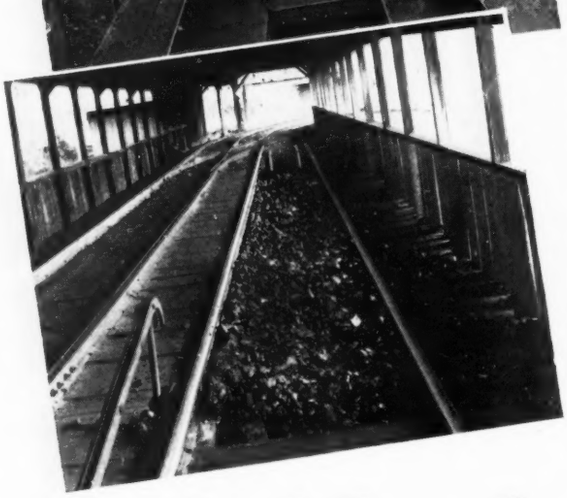
The Goodman 460 has the all-round adaptability and economy of other Goodman loaders, with the added advantage of being especially designed for high capacity loading on sharp curves and in close posting. Control is hydraulic.

Ask for Bulletin L-403



Sketches show range of side swing and elevation of front and rear conveyors.

HALSTED STREET AT 48TH • CHICAGO, ILLINOIS



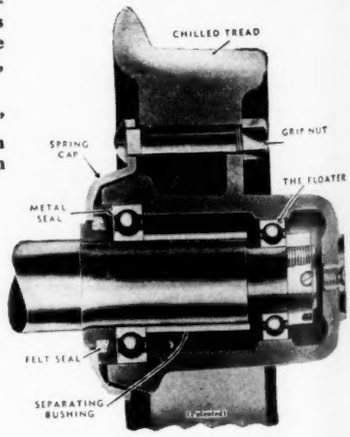
MORE TONNAGE WITH FEWER CARS AND LESS MANPOWER

If we were to tell you that your savings, after installing S-D "Automatics", would pay for these new cars in twenty-four months, your answer probably would be—"I don't believe it". It *is* unbelievable yet it happens, and your own mine may be one where such savings are possible.

We know of mines where these savings can be made, but the operators never will realize why S-D "Automatics" are so essential to maximum production, minimum manpower, and lowest production costs in mining until they see these cars in operation . . . see why fewer S-D "Automatics" are required for any given tonnage . . . why saving of manpower is so obvious. See the constant, even flow of trains of loaded cars ride across the dumping bin and, while in motion, lay the coal down gently in 1-2-3 door order—one door at a time—and at the rate of 20 or more cars per minute.

The three small photos on this page illustrate features of the new S-D "Nockout Automatic". Top—the 1-2-3 door action. The first door has lain its coal down with no unnecessary breakage. Door No. 2 is laying its coal down as the slope of coal permits. Door No. 3 will follow. Next below—a train of "Automatics" discharging coal—not a man in sight. Discharging is completely automatic with the "Nockout". At bottom—"Automatics" fill a bin level full. This feature permits continued mine operation if, for any reason, screening plant is down.

The S-D "Nockout Automatic" is your answer to More Production with fewer cars and minimum Manpower.



Sanford-Day Iron Works, KNOXVILLE, TENNESSEE

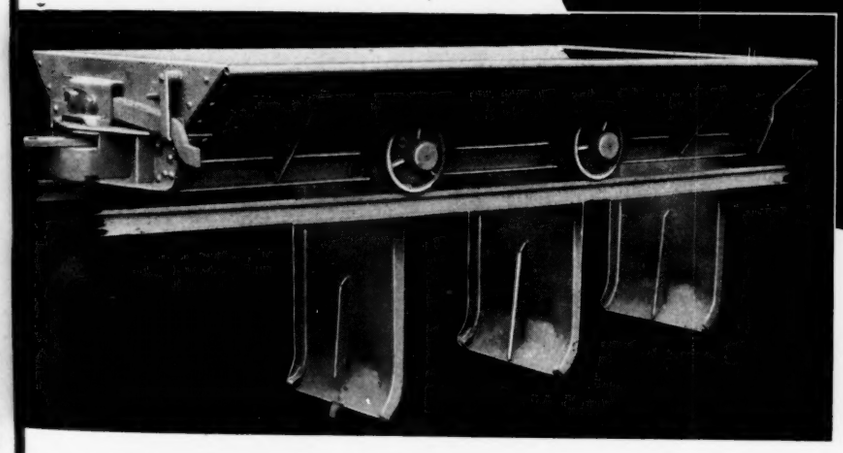
You Can't Ignore this Offer*

S-D Automatic Mine Cars are, unquestionably, today's most vital equipment necessity in many coal mines for increasing tonnage and conserving manpower. Many installations have proved this fact, while reducing operating costs tremendously, by changing over to S-D "Automatics". These case histories of known savings warrant our making S-D "Automatics" available to the progressive operator without his investing a dime.*

Now, S-D "Automatics" are available with another improvement—the S-D "Nockout" door releasing mechanism—the greatest improvement made in automatic cars since we developed the 1-2-3 method of door operation.

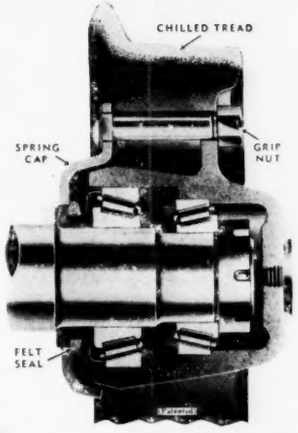
The customary door releasing mechanism (shown below) has been eliminated entirely. No projecting latch-lever . . . nothing on end of car to be damaged. Note the new latch end illustrated at right (circle)).

Our new "Nockout" door releasing mechanism is in a completely protected position. Accidental dropping of doors is next to impossible. Two separately operating latch hooks must be disengaged simultaneously for releasing the doors. This is done by the nockout device, at the storage bin. Operation is completely automatic. No manual labor can be of any assistance whatsoever, consequently all labor is eliminated. (Of course, doors can be tripped manually when desired).



YOU WANT THIS PERFORMANCE

We know that every mine operator wants the performance Sanford-Day precision bearing wheels render. Yet, the operator never can appreciate what these closed hub, demountable, automatically adjusted bearing wheels mean in power and lubrication savings until he tries them. This is the reason we offer them on Free Trial. We know what the saving results will be. We want the operator to discover this in his own mine. Both wheels, the S-D "Floater" at left and the Timken Roller Bearing wheel at right, carry our liberal guarantee. In addition, our patented annealing process plus our 42 years of designing and manufacturing wheels assure you of the most satisfactory wheel performance the mining industry has ever known.



*READ THIS RENTAL OFFER

To back our claims of more production with fewer cars, less manpower, and worthwhile cash savings with S-D "Automatics", we are willing to furnish these cars to any good operator on a liberal rental plan. We call it "liberal" because the savings from the use of the cars amount to more than the rental payments. Then, after having experienced the actual savings of S-D "Automatics", if the operator prefers to own the cars, he may exercise his option to buy them and the rentals stop. With this plan the cards are on the table, face up.

We know what the cars will do to help you while you help your Country to meet coal production demands of war. You can't lose. Let us give you all details now!

Sanford-Day Iron Works, KNOXVILLE, TENNESSEE

LOSING MANPOWER? A

Above ground!

ON CONVEYOR DRIVES—Many drives formerly requiring specially protected motors are now being well served by G-E Tri-Clad induction motors. Though classed as "open" motors, they have no openings in the upper portion. Cast-iron frame and end-shields fend off bumps and blows. Formex windings add to electrical protection.

FOR DUSTY LOCATIONS—Where dust and dirt might interfere with motor operation, G-E totally enclosed, fan-cooled induction motors offer a practical solution to conveyor-drive problems above-ground. Liberally designed metal-to-metal, dust-tight joints, plus close-clearance bearing lips and seals, keep grit away from windings and bearings.

MAIN MINE HOIST—To this all-important equipment, G-E motors, such as the wound-rotor induction motor shown above, and G-E control give flexible speed characteristics, plus unquestioned dependability. Hundreds in service throughout the mining industry have established long-term records for low operating costs.

Underground!

ON MACHINES AT THE FACE—This coal-loading machine, driven by a G-E permissible d-c motor, helps make the most of every man-hour. "Outs" for motor servicing are few, and overloads are handled without a seriously slowing down of the drive. This unit is powered with a compact motor—tested and passed by the Bureau of Mines.

On the basis of the service record of G-E permissible motors on mine locomotives, many mines now prefer G-E motors for their underground machines. A full range of types and sizes meets the needs of all standard machines.

FOR UNDERGROUND CONVEYING—Here is another G-E totally enclosed d-c motor, Bureau of Mines tested, and widely applicable to such uses as this conveyor drive. These Class BM motors have extra-heavy magnet frames and ribbed end shields. They are furnished with suitable stuffing box and ten feet of mine-type cable and air hose.

The Navy "E", for Excellence, has been awarded to 92,780 General Electric employees in six plants manufacturing naval equipment.

ADD MOTORPOWER

To produce more coal with limited manpower, you'll need more "workers" like these. Applied to modern coal-mining equipment, this G-E family of mine motors will help raise production per man-hour and protect operating continuity in the face of heavy loads.

For every kind of mining service, General Electric has motors specifically designed for the job—motors that have proved themselves able to meet extra-severe conditions in busy mines. And even standard G-E motors, such as Tri-Clad motors, have *extra protection* features that make them exceptionally well fitted to do tough jobs around the tipple.

If you are faced with increased tonnages and a critical manpower problem, be sure to consider what you can accomplish by further mechanization, using the versatile power of this G-E mining family.

Now for

COAL DUST—COKE DUST

CARBON BLACK

G-E totally enclosed motors meet Class II, Group F, Hazards

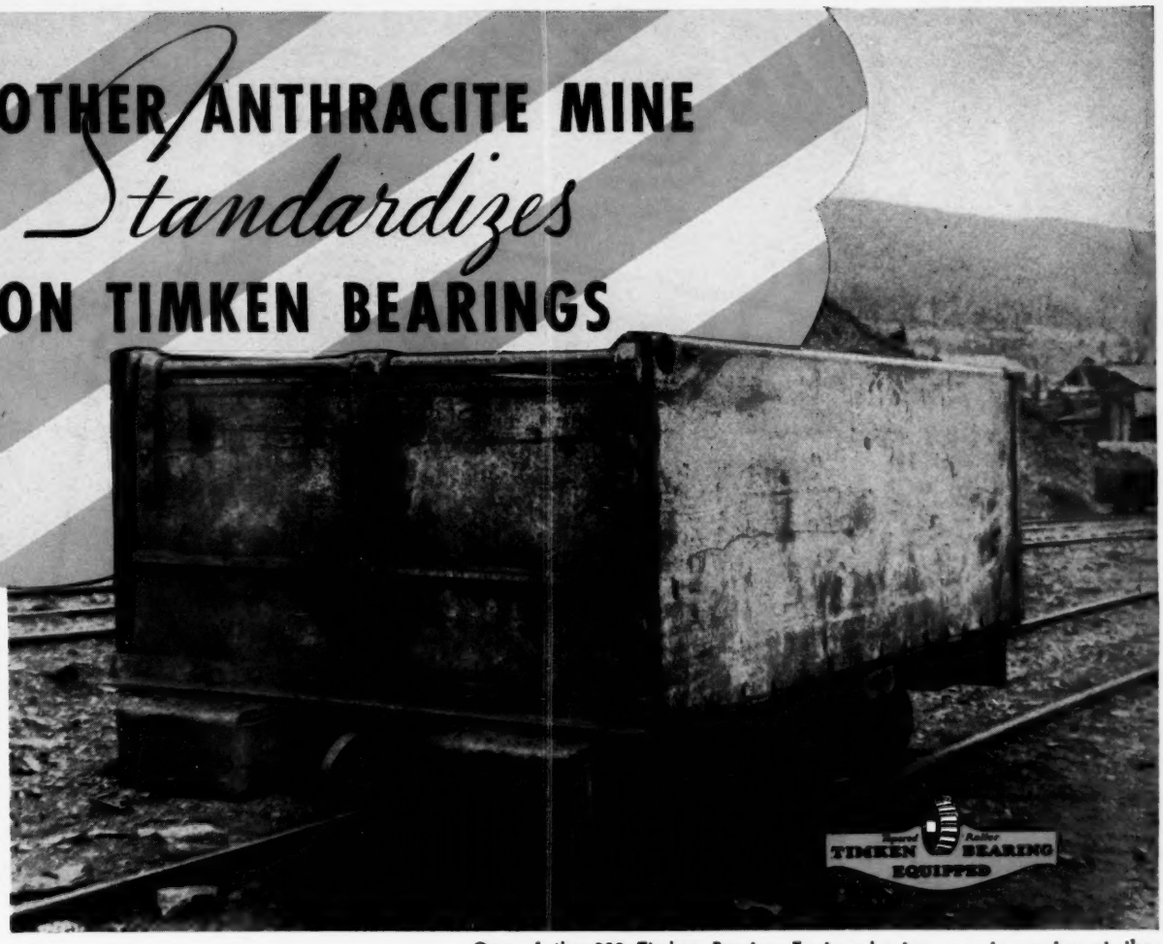
As a part of its full line of motors for hazardous locations, General Electric can now supply motors specifically listed to meet the hazards of combustible dusts included in Class II, Group F, of the National Electrical Code. Polyphase induction motors of this construction are available from 1 to 75 hp, single-phase motors to 10 hp, direct-current motors to 30 hp. Vertical motors and gear-motors are also included.

General Electric Company, Schenectady, N. Y.

Builder of TRI CLAD Motors

GENERAL ELECTRIC

ANOTHER ANTHRACITE MINE *Standardizes* ON TIMKEN BEARINGS



One of the 800 Timken Bearing Equipped mine cars in service at the Harry E. Coal Company. Built by the Irwin Foundry & Mine Car Company.

This time it's the Harry E. Coal Company, Swoyerville, Pa. This company now has 800 large modern Timken Bearing Equipped mine cars in service. All of these cars were built by the Irwin Foundry & Mine Car Company, Irwin, Pa. Their adoption by the Harry E. Coal Company marks another advance in the steady swing to Timken Bearings throughout the anthracite industry.

Since the advantages of Timken Tapered Roller Bearings for mine cars were first demonstrated upwards of 22 years ago, more than a thousand mine operators have placed over 350,000 Timken Bearing Equipped mine cars in service — and the number is constantly growing. Users know it pays to operate them because they get increased production, lower haulage costs, greater availability for service and reduced maintenance expense.

Timken Bearing Equipped mine cars, conveyors, hoists and tipple equipment are needed to help speed up the war effort. Make sure you have them. The Timken Roller Bearing Company, Canton, Ohio.

The One Test For Every Decision—Will It Help To Win The War?

"All There Is **TIMKEN** *In Bearings"*

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

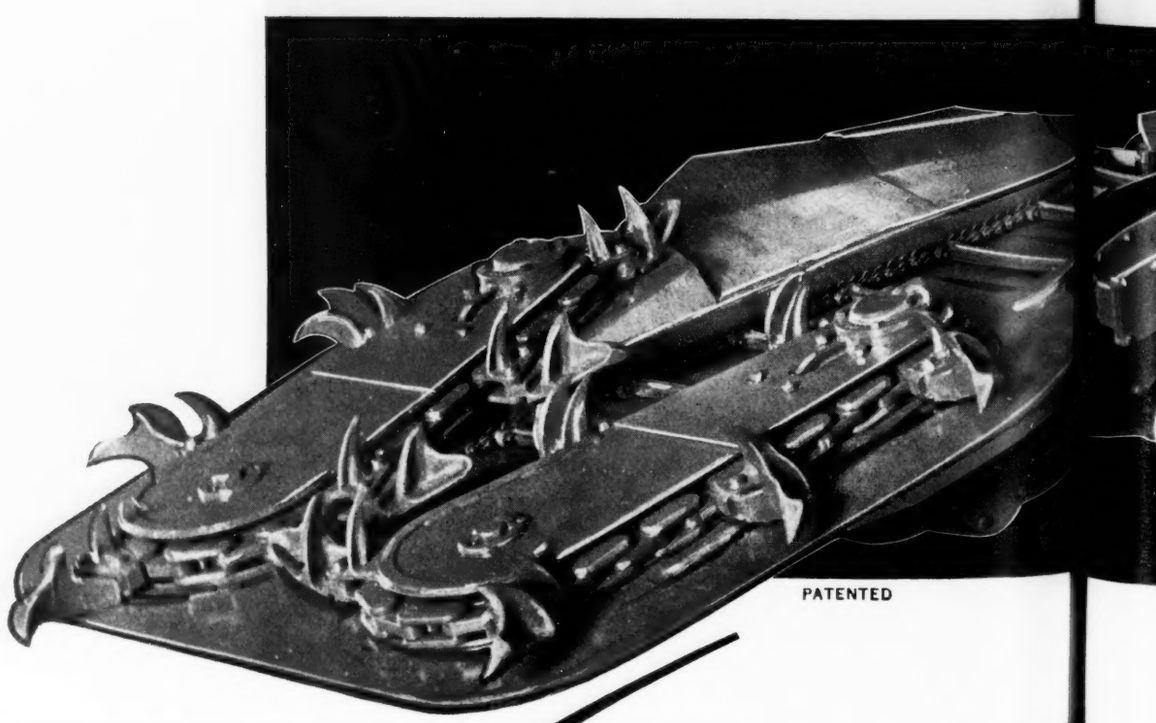
Greater TONNAGES . .

CLARKSON Universal LOADER 24 BB TRACK MOUNTED

★ VERTICAL OR HORIZONTAL ADJUSTMENT

★ OPERATED FROM ONE CENTRAL POINT

★ DIGS OUT TIGHT CORNER SHOTS PERFECTLY



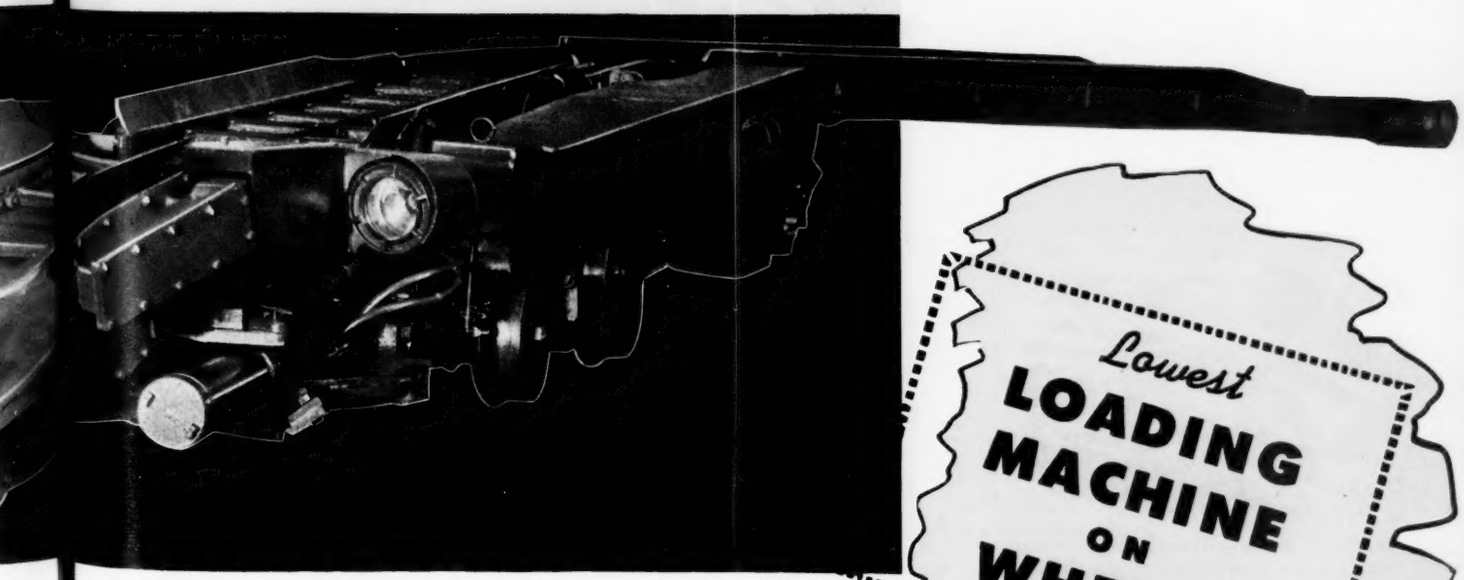
PATENTED

The CLARKSON M

Faster THAN EVER

• Unusual wide range of application adding value to unit now when greater tonnages must be produced faster than ever. The rear conveyor is hydraulically controlled and arranged to let the tail end rest on the ground when not in operation or elevated at the instant to any car height or position desired.

Built for 38-inch coal and over—has a fast loading and tramming speed. The highest point of conveyor is only 23 inches from rail. Low maintenance—flexibility—ruggedness.



Lowest
LOADING MACHINE ON WHEELS

MANUFACTURING COMPANY NASHVILLE ILLINOIS

Help on mine lubrication

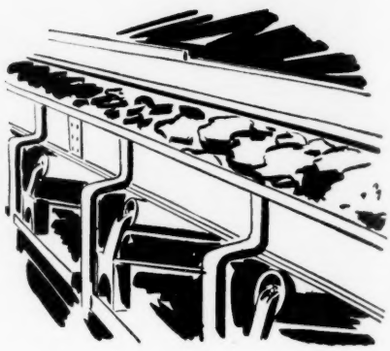
from the ground up...and down

• Have you about reached the end of your rope in devising ways to make work-worn equipment keep up with the war tonnage needed? Don't give up until you've checked lubrication from face to tipple. Lubricants that were right for one-shift operation may be entirely inadequate when operating two or three shifts, causing excessive wear on equipment. Methods of application may need changing to speed up the lubricating job and reduce lost machine time. Lubricating schedules may need revising on overworked equipment.

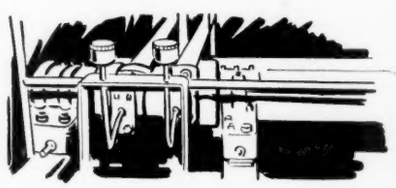
Those are some of the things to look for. A Standard Lubrication Engineer will be glad to help. His experience, at other mines, with these same problems, may be valuable to you. His knowledge of the special mine lubricants described here is certain to be.

Loaders. Probably no other mine equipment is getting the punishment that your loaders must take to keep coal flowing out. They should be first on the list for a lubricating checkup. Standard's new line of Superla Mine Loader Lubricants offers four grades of thickened oils. They cover practically all the requirements for lubricating gear cases, transmissions, and gathering head pots, including older equipment which may require a heavy type lubricant. They all have good heat resistance and hold their body at operating temperatures. They also resist separation, thickening, sludging and caking—some of the problems you may meet because of forced production on your loaders.

Mine cars. Lubricant consumed by mine cars may not be a large item, but you can save considerable oiler time and haulage power by getting the right grade and quality of lubricant for your particular equipment. Stanolind Mine Car Grease (in four grades) has the right viscosity oil and soap combination to seal car bearings against contamination or leakage without sacrificing power.



Conveyors. Stuck or sluggish idlers or roll bearings increase conveyor belt wear and power consumption. Whether this is caused by the grease solidifying at low temperatures, or by separation of the oil and soaps in the grease, Superla Grease will correct the trouble. There's a grade of Superla Grease for practically every type of plain or anti-friction bearing and for all conditions of operation. In case of excessive leakage with oil lubricated bearings, Stanodrip, a dripless oil, may help you keep them operating until replacements can be made.



Screen Eccentrics. Here's another trouble spot where good lubrication can save much oiler time and keep down repairs. It's another place where Superla Grease has eliminated overheating of bearings and leakage because it resists separation. Even under severe operating conditions, it has cut lubrication time and oil consumption as much as 50%.

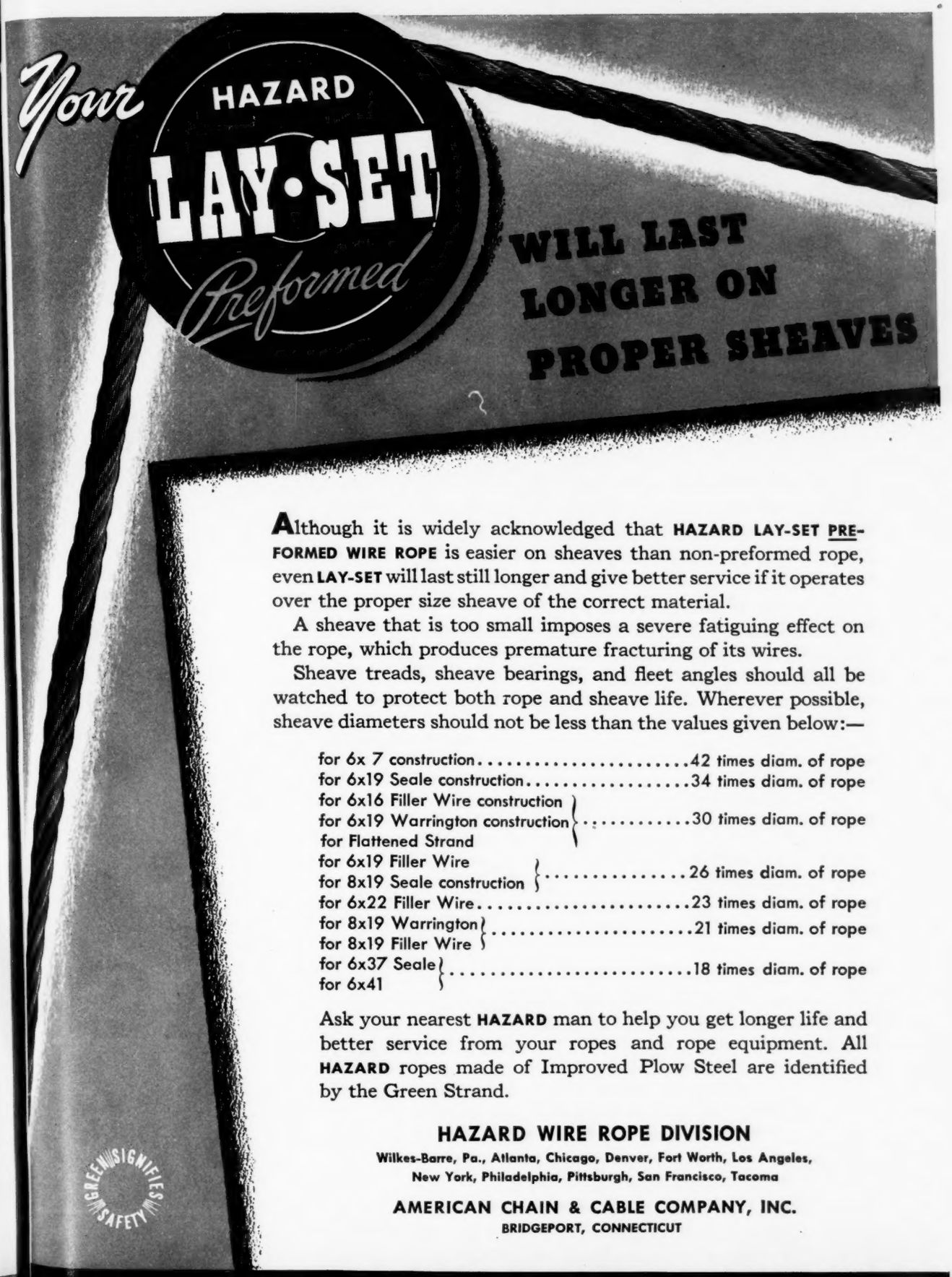
Here's how to get a Standard Lubrication Engineer

If your mine is located in the Middle West, just write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois. Ask to have the Engineer in your locality call. His service will cost nothing.

OIL IS AMMUNITION...USE IT WISELY

STANDARD OIL COMPANY (INDIANA)

★ LUBRICATION ENGINEERING



Although it is widely acknowledged that **HAZARD LAY-SET PREFORMED WIRE ROPE** is easier on sheaves than non-preformed rope, even **LAY-SET** will last still longer and give better service if it operates over the proper size sheave of the correct material.

A sheave that is too small imposes a severe fatiguing effect on the rope, which produces premature fracturing of its wires.

Sheave treads, sheave bearings, and fleet angles should all be watched to protect both rope and sheave life. Wherever possible, sheave diameters should not be less than the values given below:—

for 6x 7 construction	42 times diam. of rope
for 6x19 Seale construction	34 times diam. of rope
for 6x16 Filler Wire construction for 6x19 Warrington construction for Flattened Strand	30 times diam. of rope
for 6x19 Filler Wire for 8x19 Seale construction	26 times diam. of rope
for 6x22 Filler Wire	23 times diam. of rope
for 8x19 Warrington for 8x19 Filler Wire	21 times diam. of rope
for 6x37 Seale for 6x41	18 times diam. of rope

Ask your nearest **HAZARD** man to help you get longer life and better service from your ropes and rope equipment. All **HAZARD** ropes made of Improved Plow Steel are identified by the Green Strand.

HAZARD WIRE ROPE DIVISION

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Fort Worth, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, INC.

BRIDGEPORT, CONNECTICUT

HAZARD LAY·SET *Preformed* WIRE ROPE


FLASH and
OIL IS AMMUNITION
USE IT WISELY !
DRUMS! DRUMS! DRUMS!
War needs make it extremely important that all empty drums be returned immediately.
INDUSTRIAL
TYCOL
OILS-GREASES
SCIENTIFICALLY ENGINEERED
FOR EVERY INDUSTRIAL USE
TYCOL

FIRE

This is #2 of a series of informative messages concerning the meaning and significance of commonly used tests and terms employed to describe the characteristics of lubricating oils.

T I D E W A T E R L U B R I C A N I A

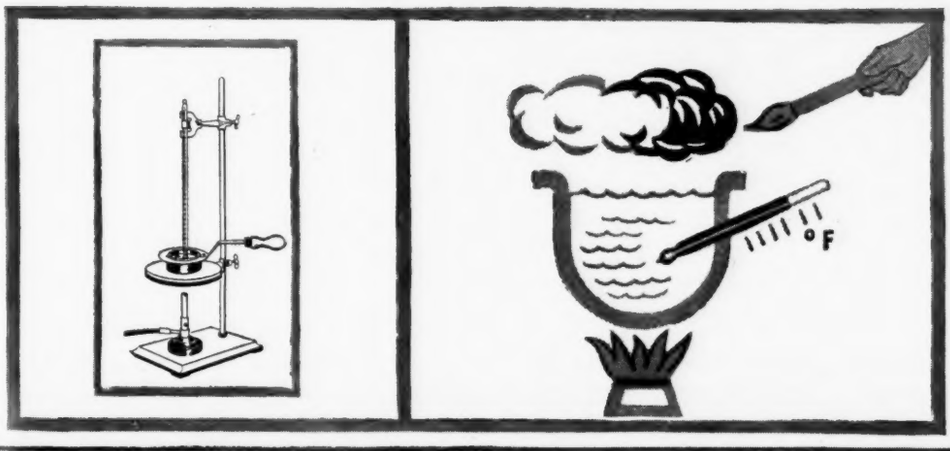
DEFINITION: That temperature at which a lubricating oil will first give off sufficient vapors to ignite when approached by a small flame or spark is termed the flash point—the lowest temperature at which when ignited, the oil continues to burn is called the fire point.

TEST: The flash point and the fire point of lubricating oil are usually determined by means of the Cleveland Open Cut Tester by following a definitely prescribed procedure. The oil under test is heated and a small pilot flame is moved over the cup with every 5°F rise in oil temperature. The first time a flash occurs on the surface of the oil, the temperature of the oil is recorded as the flash point. If the oil is heated still further and tested with the pilot flame, it will commence to burn with a continuous flame. When this occurs the oil temperature is recorded as the fire point.

For most purposes knowledge of the Flash Point alone is sufficient. It indicates the ordinary fire hazard in handling petroleum fuels and similar volatile products. With lubricating oils, Flash Points sufficiently high to avoid undue evaporation losses in service are definitely required.

The following illustrates examples of flash points of typical petroleum products, fire points being somewhat higher:

Gasoline .....below 0°F	Kerosene .....115-150°F
Cleaning Naptha ....110-115°F	Light Machine Oil....325-400°F
Heavy Cylinder Oil..525-625°F	



Tycol lubricants are subject to rigid flash point control during manufacture. Uniformly correct flash points, insuring undiluted products in every grade, are one of many Tycol characteristics contributing to high quality.

TIDE WATER ASSOCIATED OIL COMPANY

Eastern Division: 17 Battery Place, New York • *Principal Branch Offices:* Boston, Philadelphia, Pittsburgh, Charlotte, N. C.

MAKERS OF THE FAMOUS VEEDOL MOTOR OIL

INDUSTRIAL LUBRICANTS

Barber-Greene Representatives
AT YOUR SERVICE

B-G representatives can be of valuable assistance to you during the present emergency. **PARTS** Many carry in stock the B-G repair parts most frequently required. Others can assist you in ordering parts. **MAINTENANCE** They will gladly advise you on general maintenance. Many are equipped to bring your machine in and completely overhaul it. **RENTAL** B-G representatives are glad to assist you in locating machines for rental or will assist you in renting a machine which you have idle. **ENGINEERING SERVICE** Your B-G representative will gladly give you the benefit of his experience in any proposed changes in your material handling layout. **NEW MACHINES** New Barber-Greenes are not available except on very high priority. If you are planning a job which will carry such a priority, your B-G representative will give you every possible assistance.

BRANCH OFFICES
WASHINGTON ATLANTA
BIRMINGHAM CAMBRIDGE CHICAGO
CLEVELAND DETROIT MILWAUKEE

REPRESENTATIVES

ALBUQUERQUE Contractors Equipment & Supply Company
ATLANTA Yancey Bros., Inc.
BALTIMORE Henry H. Meyer Company, Inc.
BATON ROUGE Louisiana Tractor & Machinery Company
BILLINGS Western Construction Equipment Company
BINGHAMTON Ray MacDougall Equipment Company
BIRMINGHAM J. D. Pittman Tractor Company
BOISE Columbia Equipment Company
BROOKLYN Edward Ehrbar, Inc.
BUFFALO J. T. Walsh
CAMP HILL, Penna. L. B. Smith, Inc.
CHARLESTON Charleston Tractor & Equipment Company
CHATTANOOGA Burton Franklin Company
COLUMBIA Jeff Hunt Road Machinery Company
CROOKSTON Wm. H. Ziegler Company, Inc.
DALLAS Conley-Lott-Nichols Machinery Company
DENVER Ray Corson Machinery Company
DULUTH Wm. H. Ziegler Company, Inc.
FT. WAYNE Cockrell Tractor Company
GRAND RAPIDS Anderson Equipment Company
GRAND RAPIDS Parmenter & Andre
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JACKSONVILLE Don B. Graze
KANSAS CITY Paul L. Matchette Company
KNOXVILLE Wilson-Weesner-Wilkinson Company
LOS ANGELES Brown-Bevis Equipment Company
LOUISVILLE Brandeis Machinery & Supply Company
MEMPHIS Clift L. Priester
MENANDS Contractors Sales Company, Inc.
MIAMI Llewellyn Machinery Corporation
MINNEAPOLIS Wm H. Ziegler Company, Inc.
MONTGOMERY Burford-Toothaker Company
MONTREAL Mussens Canada Limited
NASHVILLE Wilson-Weesner-Wilkinson Company
NORFOLK A. L. Guille
OMAHA Anderson Equipment Company
PHILADELPHIA A. R. Amos, Jr.
PHOENIX Brown-Bevis Equipment Company
PITTSBURGH G. N. Crawford Equipment Co.
PLATTSBURG, N. Y. Vincent S. Jerry
PORTLAND Columbia Equipment Company
QUEBEC Mussens Canada Limited
RALEIGH Carolina Tractor & Equipment Company
RAPID CITY Rapid City Implement Company
ROANOKE Roanoke Tractor & Equipment Company
SALISBURY Carolina Tractor & Equipment Company
SALT LAKE CITY Lund Machinery Company
SAN ANTONIO J. E. Ingram Equipment Company
SAN FRANCISCO Jenison Machinery Company
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SIOUX FALLS Dakota Equipment Co.
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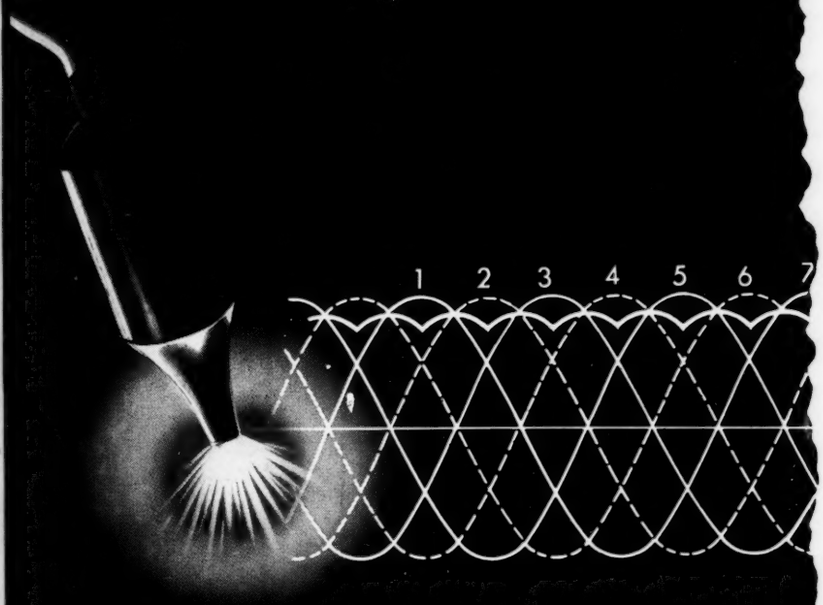
ARMY E NAVY

BARBER GREENE
AURORA, ILLINOIS

42-4

more than 2,000,000 kw serving war industries



ignitron power conversion proved in war production

Early in the peaceful 1930's Westinghouse introduced the Ignitron Rectifier—the new power conversion unit with no moving parts. Today, more than 2,000,000 kw installed in the electrochemical, steel, mining, transportation and other industries is serving to speed war production. No other method of power conversion has ever enjoyed an expansion as rapid as this electronic equipment. And there are good reasons why.

The Ignitron delivers high efficiency over the entire load range—high short-time overloads, constant 24-hour loads, or light loads.

Its operating costs are low. Operation is simple and automatic. There's no high starting demand.

Maintenance, too, is at a minimum. There are no major moving parts that require periodic replacement.

Costs are further reduced through ease of installation. No special foundations are required. Lightweight construction and vibrationless operation permit installation on any concrete floor of reasonable strength.

If you need d-c power conversion, investigate these and other advantages of the Ignitron Rectifier. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

in the mining industry

In addition to its inherent advantages of high efficiency, low operating costs and high overload capacity, the Ignitron Rectifier is ideally suited to mining service. Small, compact Ignitrons can be readily located underground. They can be transported underground on mine cars without enlarging entries.

For complete information about the Ignitron Rectifier, write Dept. 7-N for a copy of Book B-3024.

J-10242-3

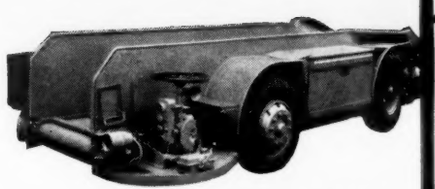
Westinghouse *Electronics at Work*

IGNITRON RECTIFIERS

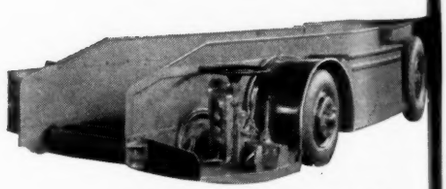
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

JOY Equipment keeps output up

JOY Equipment keeps output up because every piece of JOY Mechanized Equipment—Loader, Shuttle Car or Conveyor—is carefully and exactingly engineered and fabricated to meet the specific needs and conditions of America's coal mines. That is the reason for the exceptionally low maintenance and the very high continuous operating ability of JOY Equipment—it is built to stand up—and it does stand up!



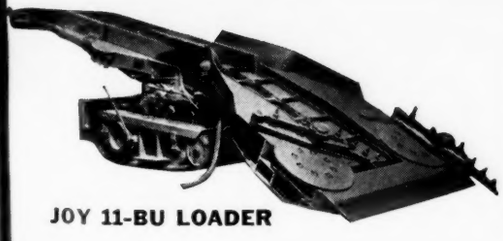
JOY 42-D SHUTTLE CAR
Permissible Type



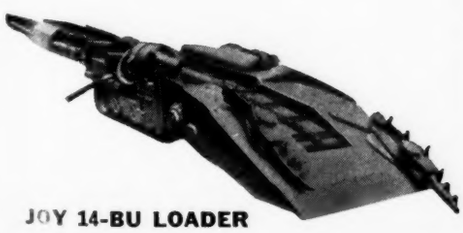
JOY 32-D SHUTTLE CAR
Permissible Type

AND THE COAL MEN OF AMERICA ARE DOING A SPLENDID JOB TOO!

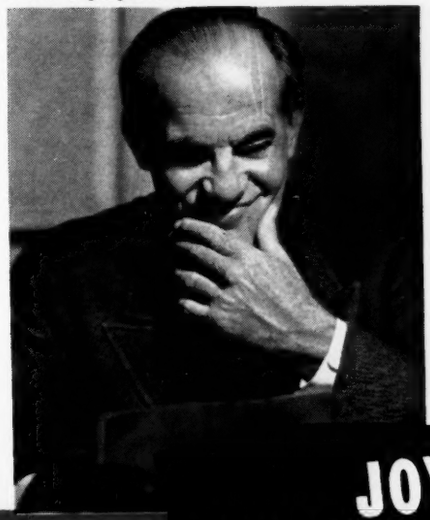
"Coal loading and handling is, today, a fast, simplified operation with modern JOY Equipment."



JOY 11-BU LOADER



JOY 14-BU LOADER



Call in a Joy Engineer to discuss your production problems

JOY
MANUFACTURING COMPANY
FRANKLIN, PA.

Textiles—in War as in Peace

World's oldest industry performs modern miracles

WITH ever quickening tempo the friendly hum of the spinning wheel has echoed down the centuries—symbol of a mighty industry.

Its hum is heard today above the din of war.

Capt. Rickenbacker heard it as the lives of his party depended upon a thickness of rubberized fabric.

The hard-pressed soldier on a far-off Pacific isle hears it when he sees fresh supplies and ammunition descending from the sky via friendly parachute.

Adolf Schickelgruber hears it when winter joins forces with the enemies of his ill-clad armies and hastens the day of his defeat.

Yes, man is dependent upon textiles from the cradle to the grave – in peace and in war.

In peace man demands comfort and beauty. In war he must have comfort and protection. The textile industry is coming up to these expectations.

It is developing hundreds of special fabrics for special purposes. It has created clothing for wear, miles high in the stratosphere, and fathoms deep under the sea, clothing to meet the daytime heat of the desert and the bitter cold of its nights, clothing for the tropics and the Arctic, the swamps and mountains – for every climate and every condition.

Modern scientific warfare has forced the development of textiles that were not even thought of a year or two ago: camouflage nets; strong, light, wind-resistant Nylon tentings for the Arctic; heavy Nylon rope for glider towing; parachutes and parachute shrouds; self-sealing gas tanks; panzer hangars; cartridge and powder bag cloths; helmet linings; gas masks; fuses; canvas tops; windshield fabrics and seat upholstery for jeeps, trucks and other motorized equipment; uniforms for all armed services and for nurses, WAACS, WAVES, SPARS and MCWRS. Then there are windbreakers, raincoats, ski-troop uniforms and other items two numerous to mention. The Star Spangled Banner itself is a textile.

The Quartermaster Corps alone has issued specifications for over 300 different fabrics! Add to this the requirements of the Navy, the Air Forces, the various Civilian Defenses, the Red Cross and Lend-Lease and the sum total of textiles required for military and allied uses is approximately 70% of the total produced before the war to meet civilian requirements!

How the textile industry has been able to meet this unprecedented war demand, superimposed upon the industrial and essential civilian needs, is an inspiring story.

First, it stepped up its production to an all-time high. *Textile World's* index of textile-mill activity records three successive records for 1940, 1941 and 1942, the period covering the defense program and the first year of the war. This index for 1942 stood at twice that of an assumed "normal" year. It is noteworthy that this was accomplished mainly with existing equipment.

Second, the textile industry did a job of plant-conversion which was a masterpiece of intra-industry cooperation and idea-sharing.

Third, its technicians developed new and superior fabrics and finishes. Its engineers and production men increased the speed and the efficiency of the entire production machine.

How well all this was done becomes evident when we consider the obstacles to be overcome. Imports of critical fibres have been cut off. There is a shortage of certain chemicals and dyes. There is a high rate of turn-over in manpower and a shortage in experienced labor. It is increasingly difficult to secure machines and repair-parts – just to mention a few of the major problems.

But the textile industry delivered. It has built up an adequate reserve for our rapidly expanding armed services. It is helping to supply the armies of our allies. It is providing for our civilian population . . . all without giving the war leaders a single moment of serious worry.

Major General Edmund B. Gregory, Quartermaster

This is the ninth of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers, and in daily newspapers in New York, Chicago and Washington, D. C. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

General of the United States, in special statements prepared for *Textile World*, and in addresses before textile groups, has stated that the cooperation of the textile industry has been outstanding and that the industry has kept ahead of schedule on all the major types of fabrics required.

General Gregory recently pointed out that of the approximately 234,000,000 yards of combed twill produced in this country in 1942, the Army took about 87%, the Navy 10%, leaving 3% for non-military purposes.

Col. Robert T. Stevens, of the Quartermaster Corps, in a recent address, referred to the output of duck. Production of that vital military fabric was twice doubled in six months, between January and July 1942, he said, and an annual capacity of 600,000,000 yards of all types of duck was made available. "The current rate of production of cotton duck is five times normal," said Col. Stevens, "and 38% comes from converted carpet, plush and upholstery mills. Based upon known requirements, production in this field is fully adequate".

"Fully adequate" is high praise when it refers to duck production. At the outbreak of the war it looked as if there was no possible chance of meeting requirements, at least during the first year. Nor would there have been if other types of mills had not shifted to making this fabric, and if experienced duck manufacturers had not gone "all-out" in teaching the newcomers, potential post-war competitors, everything they knew about the manufacture of duck. American industry offers many such examples of unselfish cooperation.

Another outstanding accomplishment, made necessary by the interruption of burlap imports, was the conversion of looms producing peacetime fabrics to the production of bag fabrics. The tremendous demand for sandbags, camouflage cloth, food, agricultural and other bagging, caused a conversion order to be issued for the purpose of raising the annual production rate of osnaburg from 263,500,000 yards to 660,000,000 yards, and bag sheeting from a rate of 488,000,000 yards to 855,000,000 yards. The result of this order, and of the military schedules already in effect, was to put the cotton weaving industry about 88% into war, essential industrial, and essential civilian production.

Plant conversion went on with feverish speed. Carpet looms were swung to blankets and duck; the lace industry turned to mosquito netting and insect netting of which it produced millions of yards. The flat-knitting industry with its tricot machines also is engaged in the manufacture of mosquito netting. The sewing thread industry was converted to the production of combed yarns. What once was the silk industry is now doing a tremendous amount of war work. Those mills which had equipped themselves for throwing Nylon yarns for hosiery are now throwing the Nylon for parachutes. That section of the silk industry that was equipped for weaving rayon fabrics is producing fabrics of high-tenacity rayon for flare chutes, cargo chutes and delivery chutes. Many silk and rayon looms that formerly wove clothing materials are now weaving parachute fabrics.

Today practically all Nylon is used for military purposes and the bulk of high-tenacity rayon goes into military fabrics.

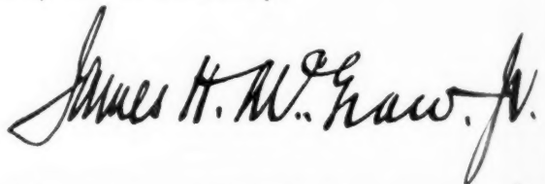
Above and beyond all the new developments is the gigantic job of producing millions of yards of standard fabrics of many colors and weaves. To produce all the uniform fabrics and blankets is in itself quite a job. The woolen and worsted industry has been doing it magnificently. Tent fabrics and summer fabrics produced by the cotton industry are no less a formidable assignment. I could point to myriad other jobs no less impressive.

The production man can indeed take pride in this record and behind the production man, the textile technician has been working tirelessly. Mildewproofing and waterproofing, so vital in a world at war, are in a new stage of effectiveness. A new process for waterproofing fabrics employs vinyl acetal plastic in place of precious rubber. Textiles that glow in the dark have been perfected for black-outs and other applications. American genius is solving problems many of which seemed insurmountable. Silk, for example, was something the Japanese thought we could never duplicate. A new synthetic textile filament that weighs but one eighth of the finest silk filament threatens to put the Japanese silkworm out of business after the war so far as we are concerned. The post-war possibilities of this development challenge the imagination.

Nor has the primary textile industry been alone in its contribution to the war. The textile machinery industry has been converted almost entirely to war work, save for a few facilities required to relieve extreme bottlenecks and supply essential maintenance and repair-parts.

Similarly, some textile mills, particularly hosiery mills hard hit by the silk and Nylon cut-off, are utilizing their space and skilled staffs to produce parts for war equipment.

The immediate significance of all this is its importance in the winning of the war. There is, however, a post-war implication which is important to the future of America. A mass production textile industry will serve civilians after the war more effectively than ever before, and will put new standards within the reach of millions. A long step has been taken toward that completely synthetic textile industry which some observers see in the future. The tempo of such changes has been accelerated tremendously. The oldest industry in the world, now one of America's largest, is showing a youth and vigor that promise much for the future... nationally and internationally.



President, McGraw-Hill Publishing Company, Inc.

COAL AGE

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

MARCH 1943

BED ROCK

GETTING DOWN to bed rock is something that must be figured on if we are to come out on top in this present conflict. But that brings up the question: "What is bed rock?" The Office of Civilian Supply, War Production Board, has now attempted to answer that question in a report to James F. Byrnes, Director of Economic Stabilization.

The figures given for fuels are interesting and, it might also be said, surprising in some respects, even when it is considered that the estimates "do not include the requirements for civilian-type goods and services needed by the armed services or for export; nor do they include the requirements for service and maintenance, operating supplies and construction of business, agricultural or institutional establishments," although allowance is made for soldiers on leave. On this basis, minimum fuel-oil requirements are placed at 127,300,000 bbl., against 162,600,000 bbl. in 1941 and 134,200,000 bbl. in 1939. Minimum bituminous coal requirements are placed at 49,550,000 tons, against estimates of 64,748,000 tons in 1941 and 67,239,000 tons in 1939. The anthracite minimum is 20,338,000 tons, against 27,896,000 tons in 1941 and 28,927,000 tons in 1939. Compared with 1939, coal takes a much heftier cut than oil, despite the fact that it is expected to take over a substantial portion of the oil load. If it comes down to bed rock, perhaps this will be changed, but at the moment it looks somewhat anomalous, to say the least.

"U. S. VS. SANTA CLAUS"

HOW MUCH steam the Department of Justice expects to put behind its Jan. 6 anti-trust case against the anthracite producers, of course, is very much in the realm of speculation. But the fact that the actions against railroads and traffic agencies, and against lamp manufacturers, have been postponed until after the war justifiably warrants such speculation. Most certainly, if favored categories are to be established, anthracite should be included. This is aside from the fact that simple justice does not warrant any action in the first place. Undoubtedly, the one thing anthracite cannot be accused of is gouging its customers or the public in general. If any case should bear the title of "U. S. vs. Santa Claus," this is it.

WHY RATION?

COAL-RATIONING talk has again receded but that is no reason for not remaining alert against it popping up again, since the idea seemingly has a number of advocates in government circles. In effect rationing is a device for assuring equitable or desired distribution of an article, commodity or service, usually a scarce one. But is coal a scarce item? The answer is no. Should it be permitted to become a scarce item. Again the answer is emphatically no. Even rationing would not cure the effects of a scarcity of coal, and in fact it would introduce new evils tending to make the effects even more pronounced. If the experiences of Great Britain and Canada are not to be repeated in this country, those who advocate rationing might better turn their efforts to making sure that coal can continue to produce.

HAVE AND HOLD

A DOLLAR saved is a dollar earned and a life saved is a life gained. The coal industry has a stake in safety. With men drawn off to the armed forces of the nation and the defense industries, those that remain must be jealously conserved. Their time, their health, their lives are more than ever matters of concern.

Where that conservation occurs—whether in the mine, in the home or on the road—is in a degree a matter of indifference. The important thing is to see that it is done. Absence of men by reason of ill health at home and lack of nursing care for the family often is the cause of lowered output, so home safety and health have a bearing on tonnage. Mining hours often are less perilsome than the idle hours of day and night, so automobile and domestic safety are industrial concerns. Nutrition that keeps men energetic, cheerful and effective deserves more consideration from those who are seeking safety and large output, for the spiritless, dopey, unhealthy man is neither a safe employee nor a big producer.

Manpower Squeeze

WILL IT CATCH COAL MINING?

"HAS COAL mining been caught in a manpower squeeze?" might equally well be the title of this study, undertaken to clarify the situation and outline what should be done if coal is to continue to serve the war effort as it should. A realistic appraisal of developments to date leads to the conclusion that the problem is becoming critical despite lengthening the work week, and that production will begin to suffer unless the present drain on mining manpower is halted.

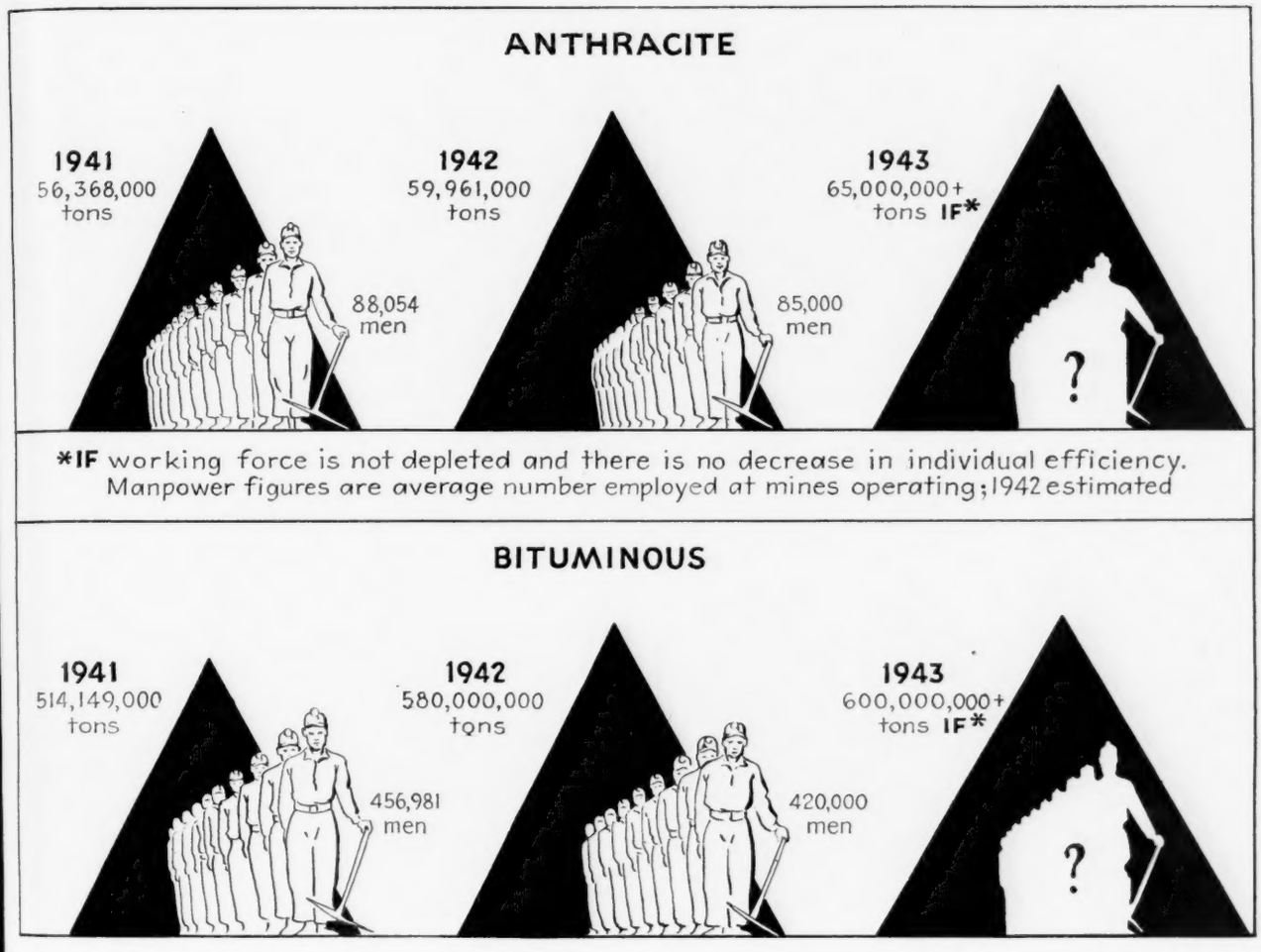
Looking no farther ahead than 1943, the mines are expected to produce 600,000,000 tons or more of bituminous coal and 65,000,000 tons or more of anthracite. Yet, between Jan. 1, 1942, and Feb. 15, 1943, the bituminous industry suffered a net loss of 67,000 men. The anthracite loss in the same period was 7,000 to 8,000 men. Furthermore, particularly in the bituminous industry, there is no unused producing capacity, with the possible exception of insignificant totals in one or two fields.

Job for Government

Admitting that operators and miners can and should expand their efforts, study of the outlook makes it plain that government agencies directly concerned with manpower, especially the War Manpower Commission, must really do a job—without delay. Otherwise, progress to date will be washed out and the war effort will be handicapped in the future by inability of the mines to supply essential coal.

Coal has earned its right to high rank in the things vital to the war effort. Food unquestionably gets first place. Coal and transportation come next, although some might make it transportation and coal. But whether it is second or third is immaterial when it is considered that coal is our chief source of heat and energy. Without it, a war effort on the scale the United States has set for itself would be impossible.

COLLISION COURSE: More Coal, Fewer Men



Coal therefore must be produced without interruption and in sufficient volume to take care of increased natural demands, accelerated conversion and necessary additions to stockpiles. As compared with World War I, incidentally, coal so far has been mined and distributed without a single order, directive or regulation from the Office of Solid Fuels Coordination. The people simply were told the facts and all possible steps were taken to make the coal available.

Now might be a good time to look at the other side of the picture. Any decrease in the flow of coal will mean a scarcity. In this instance, scarcity cannot be cured or alleviated by resorting to substitutes. Nor can use be curtailed to any appreciable degree without injuring the war effort, as coal is not something that can be done without. It either is available in the necessary quantity or it is not. Much more could be said on the subject, but it may suffice to point out two of the evils of scarcity, rationing and allocation: interruptions, arising out of short supply, in the flow of coal to essential consumers, and disruption of the efficient use pattern built up over the years by arbitrarily assigning unsuitable coals to plants designed to use economically a type normally available.

What's Necessary?

Since the production of coal must not be permitted to slacken, what must the manpower program embrace? Analysis of the situation indicates the following:

1. Preservation of the existing working force by a deferment program geared to the facts of the situation, plus adoption of measures for checking the departure of miners to other industries. Furloughing of miners may even be necessary.

2. Raising production per man by increased individual effort and accelerated installation of machinery and improved operating methods.

3. Increasing the over-all output of the available working force by eliminating voluntary absenteeism and increasing the allowable working time.

4. Recruiting and training new men not now subject to military service, although indications are that the limit in this has nearly been reached.

Some not familiar with coal mining might say that a fifth step should be taken—employment of women. Under coal-mining conditions, there is little possibility of relief from this source. But, if present restrictions were relaxed, employment of boys under 18 for many jobs in and around the mines would release men for more important duties. In peace time there may be justification for placing the lower age limit at 18. But war is another thing, and when there is an opportunity for boys to render a worth-while service, such opportunity should not be denied them.

Everything indicates that preservation of the existing working force ranks No. 1 in preventing a decline in coal production, as all the evidence points to the fact that further manpower losses of any magnitude cannot be made up in any other way. Yet, fur-

ther manpower losses are threatened. Plans for the invasion of Europe, among other things, require the "enlistment of additional millions into our armed forces," declared James F. Byrnes, Economic Stabilization Director, in a radio address Feb. 9. General Hershey, Selective Service Director, put it even more bluntly Feb. 11 when he said that "before the end of the year, the great majority of all physically fit men between 18 and 38—and I repeat 'of all'—regardless of occupation or dependents, will be in the armed services."

Departures Hurt

But if one can sympathize with the problems of those charged with putting a fighting force in the field, what about departures to other industries? Here, the picture is even less reassuring and the operator, without assistance, is powerless. In many instances, departures to other industries exceed by far inductions into the services. The February issue of the Union Pacific Coal Co. *Employees' Magazine* reports, as a case in point, a labor turnover of 92.85 percent in 1942. Of the 2,573 separations for all causes, only "some 500" represented men entering the services. Heavy separations between April 11 and Sept. 12 "occurred during the period when recruiting for labor on the Pacific Coast was heaviest and before restrictions on the use of gasoline went into effect. The loss of production incident to the labor turnover experienced was costly, the output per man-day falling off sharply."

How to keep its men is a problem that cannot be solved by the coal industry alone. The fact is coal mining is in a class by itself when it comes to available sources of men. Compared with World War I, coal mining now is 40 percent or more mechanized and the need for skilled men is correspondingly greater. Of the remaining tonnage, 90 to 95 percent is partially mechanized and requires a high degree of skill not only in operation but in maintenance.

Other war industries can draw machinists, tool makers, crane operators and the like from non-essential industries and these men can start to perform at optimum efficiency with little breaking in. Not so in coal mining. A loading-machine operator or driller can't be picked out of a refrigerator plant. He must be trained in the industry and if lost there is nothing for it but to find and train another to take his place. This, it is plain, is a serious waste of manpower. Why have to break in and train a new man when another already knows the job well?

The answer is clear and definite—government must assist in keeping miners on the job, even to the extent of excusing them from military service. This seemingly is a sweeping statement, but it actually is not, in the light of experience in Great Britain and Canada. Both discovered the costly effects of a manpower shortage in coal mining and both have had to furlough men in an attempt to repair the damage.

What about the individual productivity on which coal mining has lavished so much money and thought in past years? Fears that it will suffer seem well founded. If, as a result of using less capable or green men, it should drop 500 lb. per day, the annual tonnage loss could easily be 30,000,000 or more. Maintaining individual productivity or increasing it if possible involves machinery, methods and the individual's conception of his part in the war effort.

Considering the latter point first, developments to date strongly hint that the miner does not realize fully his part in winning the war. As an example, employees at Montour No. 4 mine, Pittsburgh Coal Co., struck Feb. 24 because the company asked further deferment of an unmarried loading-machine operator. Government, operators and miners' organizations started some time ago on a campaign to insure maximum production from every man and every machine. Has this drive lost its steam? Organization of "Victory Production Committees," for example, apparently stopped after the anthracite region, central Pennsylvania and, to a lesser extent, certain other regions got theirs to rolling. Such committees may not be the last word in stimulating individual efficiency but, in the absence of any other plan, they certainly are a step in the right direction.

Machinery Helps

Mining methods to enable a man to produce more in the same length of time have been the subject of countless thousands of words. Nevertheless, they have declined no whit in importance. Machinery, by and large, however, offers the best possibilities for higher individual production. Coal's essential character is reflected in the progressively higher priority ratings it has received. But it is debatable whether even the enlarged program for conveyors, loading machines and other equipment proposed for 1943 could completely offset a further loss in manpower, especially if a higher proportion of green replacements or otherwise less efficient men should result in a decline in individual productivity. Coal mines also are wearing out their equipment at an accelerated pace, meaning that the pressure for both new equipment and repair parts will increase. All in all, it seems evident that coal can put to good use all the new equipment that can be obtained, and that present preferential treatment should be extended to make sure that there is no shortage of necessary equipment, parts and supplies.

Longer Week the Cure?

But, it might be asked, why dwell on these points when lengthening the work week will take care of everything? It's not as simple as that, however. Among other things, absenteeism still is high and the evidence indicates that this problem is a long way from being licked. As with increasing individual efficiency, alleviating this condition rests largely on stimulating the worker's sense of responsibility, unless other compelling reasons should turn the trick. Government and miners' organizations, in addition to the operators, have a definite part in this task.

The increase from 35 to 42 hours per week already is reflected in a gain in anthracite output. From 1,100,000 to 1,200,000 for most of the fourth quarter of 1943, production rose to 1,322,000 tons for the week ended Jan. 30, 1943, the first under the six-day schedule. Output in the week ended Feb. 6 was 1,344,000 tons; Feb. 13, 1,337,000 tons.

With the program a little slower in getting under way, the upward trend due to the 42-hour week did not appear as soon in the bituminous industry. However, production reached 11,880,000 tons for the week ended Feb. 6 and went to 12,200,000 tons the week ended Feb. 13. Thus, there is reason to believe that it will be possible to maintain the average output of 12,000,000 tons or more weekly necessary to reach or exceed the 600,000,000-ton mark for 1943, provided there is no stoppage in work and the working force is not depleted.

Summing up, with all factors taken into consideration, a realistic appraisal of the situation indicates that with a 42-hour week and the present working force, plus equipment on hand or possible to obtain, the anthracite and bituminous industries, barring stoppages, have a good chance of meeting or slightly exceeding the 1943 goal of 665,000,000 tons — *but not much more.*

A work week of 48 hours now is in

prospect for coal mining as a result of the Presidential order of Feb. 9 fixing this as the minimum for the duration where necessary. Going to a 48-hour week would provide further relief for coal mining, especially if backed up by some means of reducing absenteeism, a halt in drafting and a check on shifts to other industries.

Despite outward appearances, however, a 48-hour week is not an easy solution to the coal-mining manpower problem. Aside from prospective manpower losses, there are a number of other ifs. IF absenteeism were materially reduced or eliminated, IF there was no further decline in individual efficiency, and IF the demand for coal was uniform throughout the year, meaning no seasonal swings and no loss of output to be made up at other times as a result of transportation shortages and other interruptions over which the industry has no control, supplying the nation's coal requirements would not appear unduly difficult. But—and this is a big but—these factors do influence the final results. Again taking a realistic view of the situation, it still is necessary to maintain approximately the present working force, as further losses of men, especially at the rate prevailing in 1942, unquestionably would mean a decline in the industry's capacity to meet wartime needs for coal, 48 hours or not.

Must Keep Miners

Preservation of the existing working force at not less than the present level therefore is the mark for industry and government to shoot at. Departures to other industries must be stopped and drafting must be abandoned or at least sharply curtailed. The possibilities of obtaining replacements for men leaving for other industries or taken by the draft are, as stated, sharply reduced. Nevertheless, the industry can do no less than persevere in its attempts to get new men and train them, barring a change in government policy—or even after, if there should be a change. In this work, coal operators have the services of the Area Labor Supply committees, the U. S. Employment Service and the training division of the War Manpower Commission. Even the War Production Board is ready to intercede; witness its recent request to WMC to supply 2,000 experienced miners to operations in the Far West.

Obtaining skilled men able to function efficiently under mechanical-mining conditions was becoming a problem even before hostilities broke out, and World War II has merely shoved the question farther into the spotlight. It now becomes one method of alleviating the manpower squeeze, although by no means a cure-all. Training certainly should be a part of the coal-mining agenda, not only to alleviate the present situation but also to insure an efficient operating force in the future.

The man in the mines is not actually shooting Germans or Japs, but his work is just as important. Keeping him on his job is a No. 1 task for government and industry.

TRAINING NEW MEN

Speeded by TWI Instruction Methods

Converting New Men Into Safe, Skillful Workers Objective of "Training Within Industry" Program—Work Actively Under Way in Colorado and Utah — Facilities Available Throughout the U. S.

By C. R. DOOLEY
Director, Washington, D. C.

And GEORGE M. KIRK
District Representative, Denver, Colo.
Training Within Industry
War Manpower Commission

BUILDING a fighting force able to win a victory on fronts all over the world and at the same time creating a production machine able to supply this fighting force and our allies everything they need to do the job inevitably brought about a necessity for making the best possible use of the manpower of the United States. It was recognized in the early days of the National Defense Advisory Committee that the needs of the armed forces, plus the requirements of industry, would necessitate the employment and training of substantial numbers of new men and women. Consequently, a "Training Within Industry Division" was set up with regional offices throughout the United States. This organization now is functioning under the War Manpower Commission.

The function of this division is to assist industries in the problem of converting new men into safe, skillful workers in the shortest possible time. The method is training supervisors, leadmen, and instructors in the art of training new men, as well as old, in new operating jobs. This is the method that has been followed in the coal-mining industry, notably in Colorado and Utah. Facilities for such training are available throughout the United States.

The method is not new and in fact has long been the practice in certain mass-production industries like the automobile industry. Briefly, it consists of two essentials: (1) a complete breakdown of the job into elemental operations and (2) definite and thorough instruction in each operation, taking them one step at a time. The supervisor, acting as an instructor, stays with the man until he is certain the man knows exactly how the job is to be done. Skill in instructing by this method comes through practice in instruction by demonstration in the 10-hour sessions.

In Utah, the possibility of a shortage in miners became apparent early

JIT trainees at Frederick mine, Colorado Fuel & Iron Corp., Trinidad, Colo.

Left to right, first row, Frank Jerant, John McAllister, George Jerant, William Wozniak, Luke Egan; second row, Camillo Palmero, M. M. Watson (superintendent), Ernest Wilcox; third row, Frank Fotheringill, John Dennison, John Seavarda, Jerry Randack, Francis Leonar, Leonard Ford, Graham Miller (WMC trainer); back row, Hebart Berry and Joe Falagrady.

in 1942. Approximately 2,300 men were employed in the mines in July when a survey was made by the Utah Coal Producers' Association under the direction of B. P. Manley, executive secretary. On the basis of this survey, it was estimated that about 5,300 men —an increase of 3,000—would be required to operate the mines at full production in November and December of 1942.

Consultation with the Area Labor Supply Committee in Salt Lake City revealed that it apparently would be impossible to find anywhere near 3,000 trained coal miners. The problem was further aggravated by the fact that some of the men then working at the mines undoubtedly would be drafted and others would leave to take jobs elsewhere. The chairman of the Area Labor Supply Committee expressed the opinion that it would be up to Training Within Industry to help solve this problem through the training of new workers.

Representatives of the Utah Coal Producers' Association met with representatives of Selective Service, the U. S. Employment Service, and the Area Labor Supply Committee in July to canvass the prospects. At that time, K. B. Browning, assistant district representative, explained the "Job Instructor Training Program." Later, he called on individual operators and mine superintendents. The result was general acceptance of the idea. An institute was held at Price, Utah, Aug. 5-7, by Roy A. Hinderman, institute leader. All the larger mines sent men to this institute to receive instruction in JIT. Since that time, training sessions have been held at a number of Utah mines under the leadership of men who attended the institute.

How the program operates is illustrated by the work at the Kenilworth (Utah) mine of the Independent Coal & Coke Co., George Jacksosn, superintendent, employing some 500 men. The two satety men who attended the institute took on the job of acting as JIT trainers. Top supervisory men, including the superintendent, were first put through a 10-hour course, after which three 10-hour courses were scheduled for other bosses and department heads. The plan was to continue instruction to the point where nearly all skilled men, such as drillers and cutters, would have the training, as these men have the responsibility of instructing new men in the operation of this and other equipment. The project was first cleared through the miners' union, including the local officials, as it was expected that some 5 to 10 percent of the mine personnel would require JIT.

One of the major features of the training at Kenilworth was the provision for a thorough and intelligent follow-up. The two trainers were given the responsibility of making job breakdowns for all mining operations, as well as the responsibility of assisting the men in the application of the instruction method, which comprises four steps. First is finding out what the worker knows about the job, getting him interested, and otherwise preparing him for instruction. Second is presenting the operation carefully and patiently, stressing key points and taking up no more than one point at a time. Third is testing him out by having him try the job, telling about it as he goes, which provides an opportunity for ascertaining how much he took in as well as for correcting errors. Fourth is following up after the man goes on his own, including designating a man to whom the worker can go for help, checking on how he is doing at frequent intervals, and encouraging him to ask questions and look for key points as he progresses. When the worker proves he can get along, coaching and close follow-up are tapered off.

In addition to the job breakdown, instructors are encouraged to prepare time-tables showing how much skill the man is expected to have and how soon; to provide the right tools, equipment, and materials; and to have the working place properly arranged—just as the worker will be expected to keep it.

In addition to the Independent Coal & Coke Co., Utah, companies participating in the institute at Price and instituting job-instruction training included the Spring Canyon Coal Co. (Standard and Royal mines), Utah Fuel Co. (Castle Gate, Clear Creek, and Sunnyside mines) and the United States Fuel Co. (King mine). Provision also was made for such training at the new Geneva mine of the Defense Plant Division of the Columbia Steel Co. In this case, new men, as they come on the payroll, are put through the training program.

Colorado Adopts Plan

The first coal institute in Colorado was the result of conferences between the Northern Colorado Coal Operators' Association, TWI, and the president of District 15, United Mine Workers of America. Participants in this institute were the William E. Russell Coal Co. (Russell and Crown mines), McNeil Coal Corp. (Sterling mine), Consolidated Coal & Coke Co. (Baum mine), Black Diamond Coal Co. (Black Diamond mine) and the National Fuel Co. (Monarch No. 2 mine). In addition, at the instance of Thomas Allen, State mine inspector, representatives of his office participated in the first institute and subsequently all instructors in general mining classes took the 10-hour course.

JIT training programs also have been installed at mines in southern Colorado, including the Frederick

mine of the Colorado Fuel & Iron Corp.; George H. Rupp, manager of the mining department, and R. L. Hair, superintendent of coal mines, lending their assistance in getting the sessions under way. Training topics at Frederick have included, as examples, setting props, packing pumps, running centers, assembling safety lamps, constructing line brattices, laying track, assembling jackhammers, and laying out room curves. The sessions were held early in September, 1942, with Graham R. Miller, panel consultant, WMC trainer and institute conductor, in charge. Mr. Miller is a son of Frank C. Miller, former C. F. & I. mining engineer, and gave the course during a vacation period.

Skill Quickly Acquired

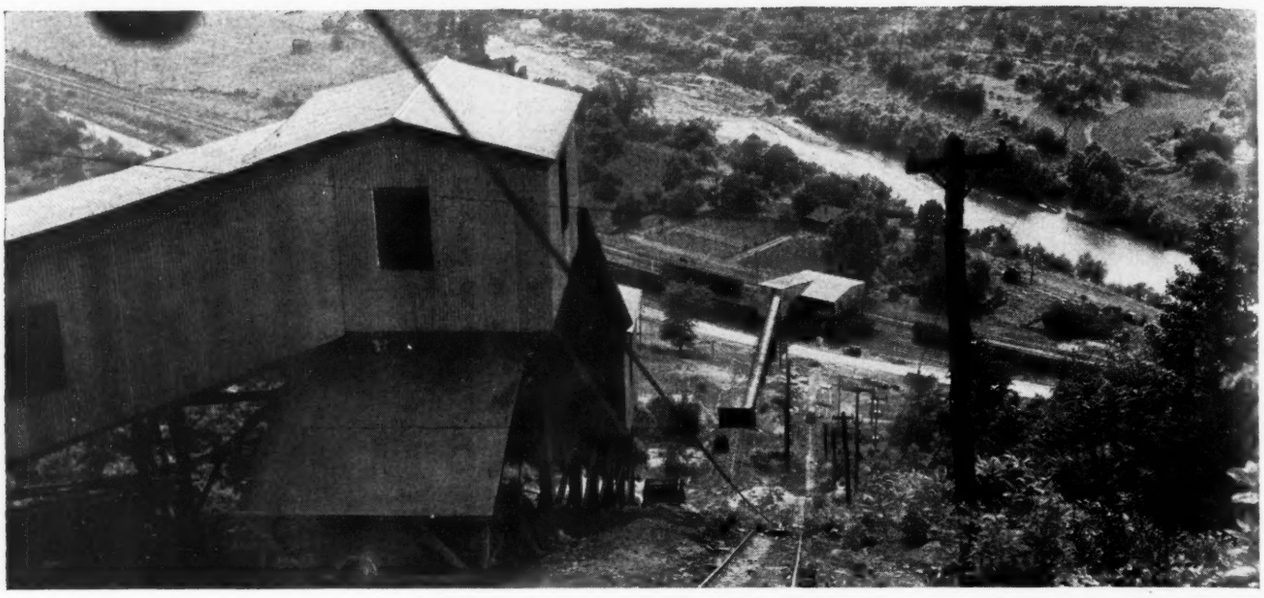
The program at Frederick was compressed into a week's time and was one of the first in the State. The mine employs some 800 men and many new men are being broken in. Mine foremen and their assistants are required to instruct on the job and JIT helps them bring to perfection the methods used by veteran supervisors. Since the men are more or less scattered, the foreman must make every minute count. The JIT program assures that a new worker will be able to do the job exactly as he was instructed. All the operating steps and key points are covered completely and the new worker demonstrates to the satisfaction of the foreman his ability to perform all the operations.

Men who took the course at Frederick are shown in an accompanying illustration. Other illustrations show the training sequence in prop setting, beginning with step No. 1, testing the roof, and ending with step No. 5, tightening the cap piece. Companion illustrations show how the man who learned the job on the surface applied his knowledge in instructing a beginner in the mine. The foreman in question reported that after this training it required much less time to break in a new man than formerly.

Plans for the Far West call for extension of JIT work to additional mines in Colorado and Utah, as well as to properties in Wyoming and other States where the need arises. As stated, facilities are available for assisting in the inauguration of such training anywhere in the United States.

Theory and practice at Frederick mine

At the left in the illustrations, M. M. Watson shows Tony Barlo the various steps in setting a prop, as listed on the blackboard, while William Wozniak and George Jerant observe; at the right in each view, Barlo passes on his knowledge to a new man on the job.



Winisle preparation plant. The coal is cleaned in the headhouse and is screened and loaded in the tipple in the valley.

SHAKER MINING PAYS

At Winisle Coal Corporation Property

Four Shaker Conveyors With 22 Men Average 400 Tons per Shift From Entries and Rooms in 42-In. Coal—Daily Mine Output, Two Shifts, 800 Tons From Shakers and 200 Tons From Hand Loaders

IF MINING costs were to be kept in line and a reasonable return on the investment secured, the present management of the Winisle Coal Corp. realized, in taking charge of this mine in October, 1936, that the coal would have to be loaded mechanically. Accordingly, a long-range viewpoint was taken in the layout of the development and the method of mining.

The Winisle mine is located at Phico, near Chapmanville, Logan County, W. Va., on State Highway No. 10, about 12 miles north of Logan. It is serviced by the Guyan Valley branch of the Chesapeake & Ohio Ry.

The seam mined has for years been called the Winifrede. However, it has not to date been definitely correlated with the main coal seams in this district. The coal mined averages 36 to 46 in. in thickness. The roof is slate and sandstone and the bottom is a hard fireclay. In general, the seam is rolling, with grades up to 10 percent. The coal above the parting (Fig. 1) is mined in the rooms and butt entries while, in the main entries, to obtain height, the parting and lower 8 to 12 in. of coal is taken.

Tipple and Market—In opening up this property, one of the major expenses was the installation of a completely modern tipple. It was not deemed necessary to install a complete mechanical cleaning plant because of the nature of the coal seam. The coal is mechanically screened at the top of the hill and all sizes above 2 in. are cleaned by hand picking. The refuse is disposed of at this point, which eliminates the disposal problem in the tipple at the foot of the hill. The 2-in. is bypassed from the shaker screens and is reassembled with the hand-picked coal before it is dumped into the monitor chute. Provisions were made so that air cleaners can be installed if it ever is deemed necessary to clean this size.

At present, the tipple operates 1½ shifts per day. The coal goes to the domestic market in four different classifications: plus 6-in. lump, 6x3-in. egg, 3x2-in. stove and minus 2-in. slack. It is ideal for shipment and storage because of its very hard structure. Inherent ash is less than 6 percent, and the coal has a heating value of 14,000 B.t.u.

Mining System—Exhaustive studies of the various types of applications of underground mining equipment were made in planning a system of room-and-pillar mining. It was decided that the mine be laid out for shaker conveyors. Accordingly, in 1938, two Goodman Type G-15 shaker conveyors complete with automatic duckbills were purchased. The tonnages and costs obtained with these initial units justified the purchase of two additional units, making a total of four.

This drift mine was opened by the four-entry system. Two butt, or room, entries are turned off on 650-ft. centers at an angle as illustrated in Fig. 1. The entries, therefore, parallel the

coal faces, so that in room work full advantage of the coal cleavage may be taken. The two entries are driven to a predetermined boundary by two shaker conveyors, which are then turned into rooms and the entry panel is worked out on the retreat as shown in Fig. 1.

The four main entries are driven by hand loaders 14 ft. wide on 50- and 60-ft. centers, with breakthroughs on 80-ft. centers between Entries 1 and 2 and 3 and 4. Between Entries 2 and 3, the pillar is broken only every 325 ft., which reduces permanent stoppings to a minimum, as two entries are used for intake and two for return. A 200-ft. barrier pillar is left to protect the main entries. Butt entries are driven 26 ft. wide on 50-ft. centers, with breakthroughs on 75-ft. centers.

Rooms are worked 28 ft. wide and are driven up on 37½-ft. centers. They are worked to a depth of 300 ft. from the center line of the entry.

Entry Work—As previously stated, the main entries are driven by hand-loading methods. Bottom is taken in the main haulage entries to provide sufficient clearance by cutting under the fireclay parting (Fig. 1). After shooting, the upper seam of coal is hand-loaded out on top of the rock. The rock then is loaded out separately, after which the bottom coal is taken up and loaded. No bottom is taken in the butt entries or in rooms.

The two butt entries are driven up simultaneously with shaker conveyors and automatic duckbills, as shown in Fig. 2. In the haulage entry, coal discharges from the conveyor pan line directly into an elevating conveyor. The elevating conveyor in turn discharges into all-steel stub-axle mine cars 24 in. high, 7 ft. wide and 13 ft. long over all. These cars, with a capacity of 3 tons each, are pulled past the loading point by a car hoist located as shown in Fig. 2.

Trips of 15 cars are pulled from the main loading point by a 4- or 6-ton locomotive to the main haulage, where a 30-car trip is made up and hauled to the dump—a distance of about one mile. Empty cars are first turned around by means of a Y and then are pushed through the breakthrough into the aircourse and coupled up with the empty cars being loaded. This loop haulage insures a continuous string of empty cars, with the result that very little loading time is lost per shift.

Coal from the shaker conveyor located in the aircourse discharges onto a chain gathering conveyor, as shown in Fig. 2. The chain conveyor brings the coal from the aircourse to the haulage entry, where it empties into the elevating conveyor. Thus, there is but one loading point for the two headings.

The two shaker pan lines are carried up 3 ft. from the inside rib. This permits track to be laid in both entries as the headings advance and also provides clearance for one row of posts between the pan line and track.

Entry faces are advanced approximately 350 ft. from the loading point before moving up. The next loading point is 300 ft., or four breakthroughs, ahead, with the remaining 50 ft. utilized for setting up and putting on the duckbill.

Entry labor consists of eleven men in all, including the foreman. There are four facemen in each heading, one loading-point man and one supply man for the two working places. The four men at the face are: duckbill operator, duckbill helper, machineman and machineman's helper. It would be possible to use only three facemen but the coal is so hard that it requires two men to drill.

An average of four cuts per shift is loaded out of each face, or approximately 200 tons for the two shaking conveyors. Depth of undercut is 6½ ft. and the height of the coal averages 42 in.

Room Work—Rooms are worked on each side of the butt entries by two shaker conveyors and automatic

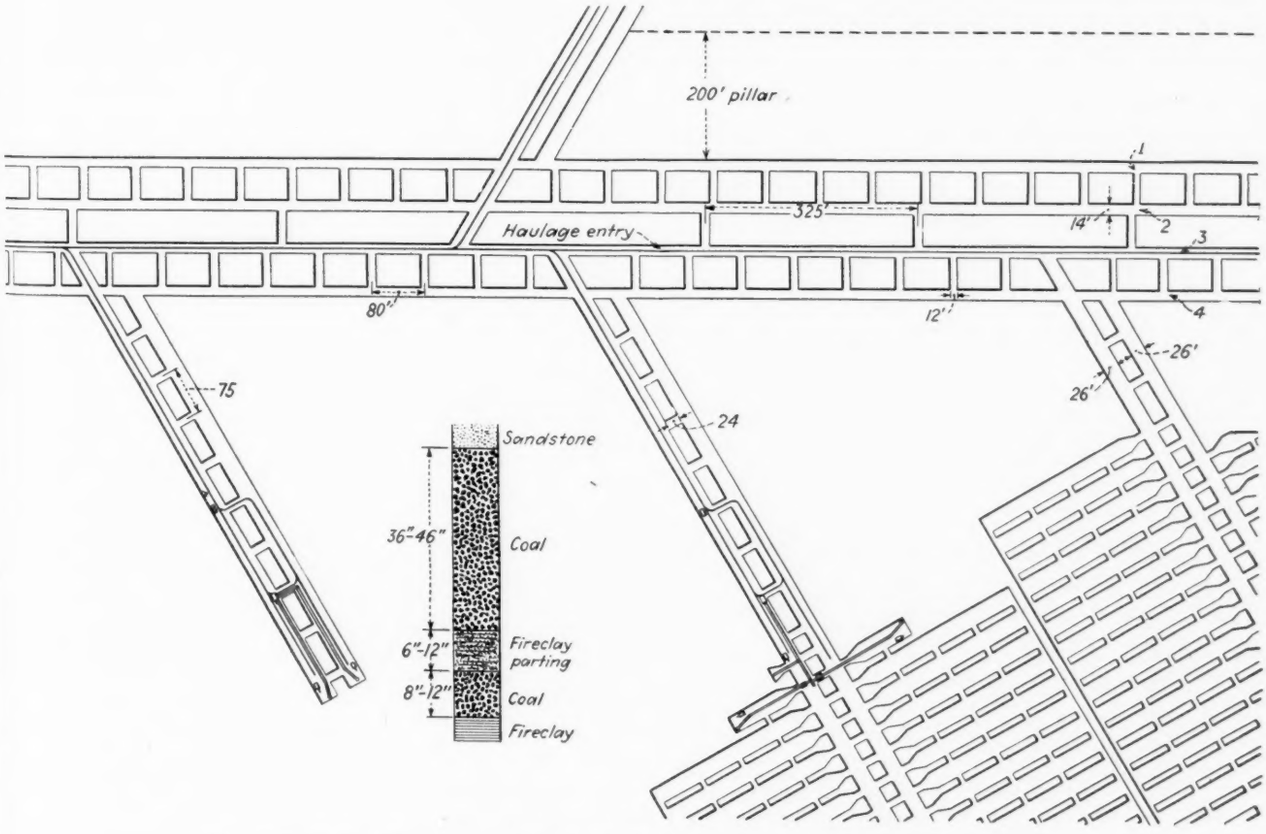


Fig. 1—Seam section and general plan for driving entries and working rooms at Winisle.

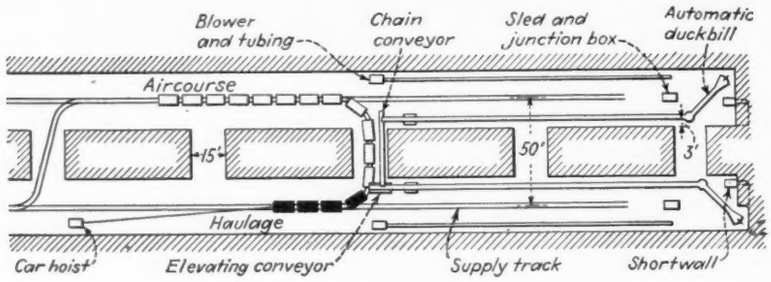


Fig. 2—Details of entry-driving set-up.

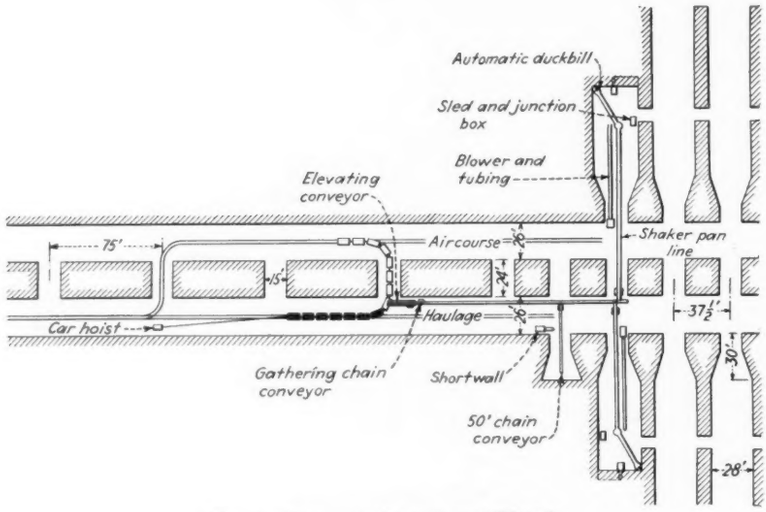


Fig. 3—Room-working plan at Winisle.

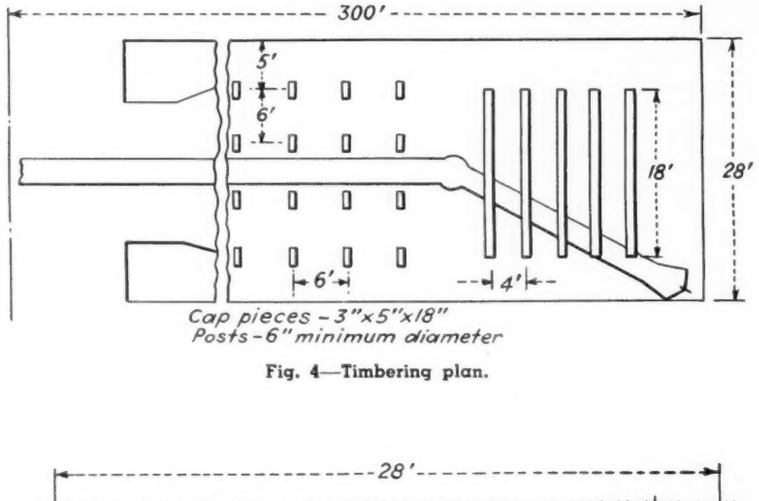


Fig. 4—Timbering plan.

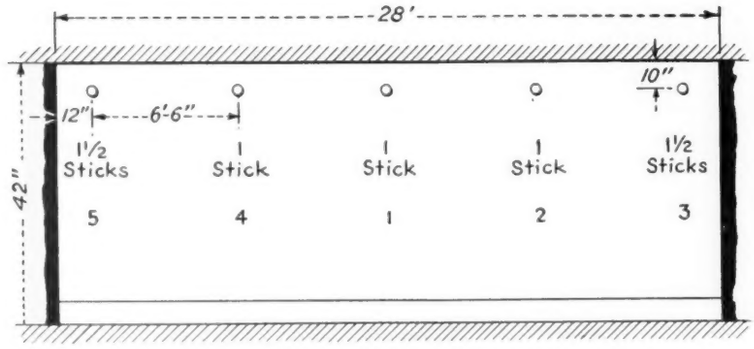


Fig. 5—Drilling pattern and firing sequence.

duckbills, as shown in Fig. 3. The coal discharges from the shaker pan lines onto a chain gathering conveyor located in the haulage entry as shown. This chain conveyor has a maximum length of 350 ft. The coal then is conveyed down the entry, where it discharges into an elevating conveyor, thence into mine cars. The same system of loop haulage as in entry work is used, and the same boom holes and track layout that were employed in the entries going up are used on the retreat.

Two men, loading onto a small 50-ft. chain conveyor, neck the rooms and cut the breakthroughs in the chain pillar as shown in Fig. 3. This work is done in advance of the rooms so that no time or tonnage is lost by hand loading onto the shaker conveyors when they are moved to the next set-up, the duckbills being connected to the pan line as soon as the drive is set. Rooms are not necked on the aircourse side, as there is sufficient room to connect up the duckbill and start it off. The two men work three shifts a week to keep the places ahead prepared for the shaker-conveyor units. They are regular men and are "floated," or shifted about, to other working places, as the mine works six days a week.

More Headings Scheduled

A three-butt-entry system will be used in the future. This will eliminate necking the rooms in the haulage entry by hand and also will provide a more continuous flow of air at the working faces and eliminate "check" curtains at the loading point where cars have to pass through when a two-entry system is employed.

All working places are ventilated by means of breakthroughs driven at regular intervals. However, blowers and flexible tubing are used as an efficiency measure to remove the smoke and fumes and permit the men to return immediately to the working faces after shots have been fired.

The production per shift from the two shaker convevors in room work is approximatelv 200 tons. This is the same as is obtained in entry work, as there is very little difference in the widths of the butt entries and the rooms. An eleven-man crew also is used in room work, with four men at each of the two faces as in entry work.

Face Cycle, Room and Entry Work—The face cycle used in both butt entries and rooms is continuous and proceeds as follows: Holes 1, 2 and 3 (Fig. 5) are shot as soon as the shortwall machine has cut past the

center. The duckbill starts from the right rib and cleans the loose coal to the center, then cleans up the half of the cut, working from the center back to the right rib. The machine in the meantime has cut out and pulls over to the right and sumps.

Holes 4 and 5 then are fired and the duckbill cleans the loose coal from the center to the left rib. Then it cleans up the left half of the face, finishing in the center. By this time, the machine has cut over to the center and is in position to pull up the duckbill. By using a telescopic trough connected to the duckbill and fitting in the pan line, it is necessary to put a pan on only every two cuts. The two duckbill men pan up when required and in addition load and tamp the holes. The two machinemen also drill, shoot and keep the timbering up.

This system insures at least two operations going on at the same time and sometimes as many as four during the cycle.

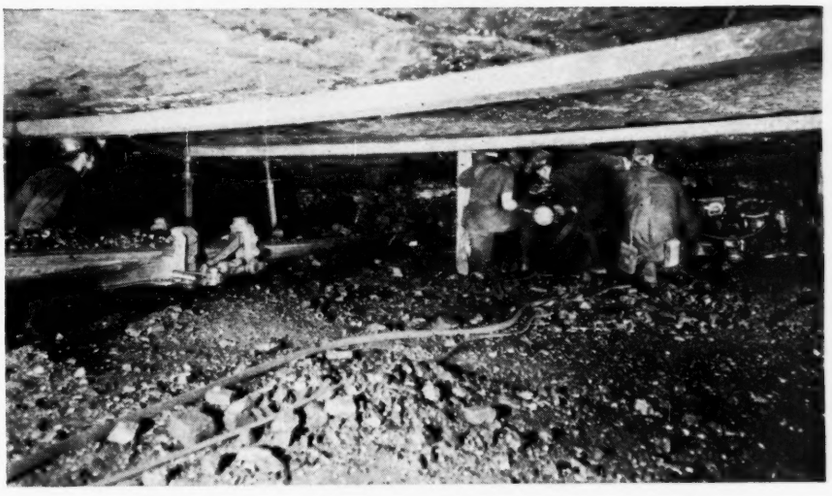
Moving Systematized

Moving Conveyors, Entries—Nine men will move 300 ft. ahead and set up all the equipment in one shift. The procedure is the same in the aircourse and haulage entries, both set-ups being the same. Two men disconnect the pans and ball-frame supports, loading them on a pushcart and taking them to the face as needed. Two men pull up and set the shaker drive, this 300-ft. move being accomplished quickly and safely with the shortwall mining machine. The shortwall is dragged to where the drive will be set up and jacked down. The standard 50-ft. head rope is removed from the drum and a special 325-ft. length of ⅜-in. flexible rope is fastened to the drive and several wraps are taken around the head-rope drum on the machine, using it as a winch. The machine then is put in high feed, control wide open. If the drive hangs up while being moved no damage results, as the rope simply slips on the drum. The move is made all in one hitch.

As soon as each face crew has the drive set and the duckbill connected, they move up the short chain conveyor shown in Fig. 2. The switches and curved sections of the track then are brought up and laid. It is not necessary to lay any track in either entry, as this work is kept up as the headings advance. The hoist then is brought up and the move is complete when the wiring is finished.

Moving Conveyors, Rooms—Moving the shaker conveyor unit from one room to the adjacent room site is done by four men. The operation is performed between shifts so that the production can be maintained at the same level at all times. The two machinemen bring the machine and duckbill from the face to the new room site. While this work is being done, the other two men move the drive down the entry to the new location. Moving the drive is accomplished by using the machine rope

Loaded trip entering the dump.



Duckbill cleaning up left half of face while cutting and drilling proceed on the right. Crossbars are supported on roof jacks.

WINISLE MINE EQUIPMENT

Number	Equipment	
4	Type G-15-B-82 shaker conveyors, No. 1 troughing	Goodman Mfg. Co.
4	Type A1½G automatic duckbills	Goodman Mfg. Co.
6	Type 112 AA shortwall mining machines, 7-ft. cutter bars, pick-point bits	Goodman Mfg. Co.
5	Type A-7 hand-held electric coal drills	Jeffrey Mfg. Co.
2	Type 61-AM chain conveyors, 350 ft. long	Jeffrey Mfg. Co.
2	Type 61-HG chain conveyors, 50 ft. long	Jeffrey Mfg. Co.
2	Type 61-EW elevating conveyors	Jeffrey Mfg. Co.
2	Type MH88 6-ton locomotives	Jeffrey Mfg. Co.
2	Type MH96 4-ton locomotives	Jeffrey Mfg. Co.
1	4x5 air compressor	Allis-Chalmers Mfg. Co.
125	All-steel stub-axle cars	Enterprise Wheel & Car Corp.
2	HKL hoists	Brown-Fayro Co.
4	BC tubing blowers	Brown-Fayro Co.
1	Propellor-type fan, "Nuair"	Meier Machine & Electric Co.

Other materials and equipment:

12-in. "Ventube"	du Pont
Permissible powder, "Lump Coal C"	du Pont
Track gage	44 in.
Weight of rail used in mains	70-lb.
Weight of rail used in butt entries	40-lb.

on the shortwall machine employed by the two men hand-loading room necks and breakthroughs. If the machine is on the opposite side of the chain conveyor from the drive being moved, a jack pipe and sheave are set so that the drive can be pulled down the entry. The shaker drive then is set up and the duckbill connected. The next shift then is ready to load coal. Conveyor pans, as needed, are taken from the room just worked out by the supply man. These moves have been made in three hours.

Moving Gathering Conveyors—Sections of the chain conveyors are taken off as the rooms are worked out toward the loading point. When the last rooms are being worked the chain gathering conveyor and elevating conveyor are moved 300 ft. back down the entry to the next loading point. This work is done on the week-end before the rooms are worked out so that production can be maintained on working days. It requires eight men one shift to do this work, which includes moving the curved track and hoist.

Drilling, Shooting, Timbering—Five rows of crossbars supported by safety jacks are installed at the face (Fig. 4). They are 18 ft. long and are set 4 ft. apart to provide adequate protection for the men working at the face. The safety jacks are moved as required when the duckbill is loading a cut. As each cut is finished and loaded the last cross timber is removed and set at the face. It is replaced by capped posts on 6-ft. centers (Fig. 4).

Five holes 6½ ft. deep are drilled in the face. Each hole is 10 in. from the top with the two end holes 12 in. from each rib. The others are placed 6½ ft. apart across the face (Fig. 5). One and one-half sticks of 1½x6-in. permissible powder is placed in each of the two rib holes and one stick each is used in the other three holes. The holes are tamped with clay dummies and the order of firing is shown in Fig. 5.

Production—The mine is today producing approximately 1,000 tons per day, working two shifts a day six days per week. The four shaker conveyors and duckbills account for 800 tons per day while the remaining 200 tons is produced by 15 hand loaders. These hand loaders drive up the main entries and work small irregular areas of coal where it would not pay to set up and load mechanically.

The management is considering the possibility of stepping production up to 1,500 tons per day, if the necessary equipment can be obtained.

Personnel—P. A. O'Neil is president of the Winisle Coal Corp., with offices at 310 South Michigan Ave., Chicago. J. R. Fields is vice president and V. D. Buckley is secretary-treasurer. J. E. Davis is general manager; R. L. Morgan is superintendent; Rodney Honaker is safety director; and R. C. Jones is mine foreman.

33-YD. SHOVEL

Uncovers 4,000 Tons Daily at Flamingo

54-In. Seam Yields Over 4,000 Tons Daily—33-Yd. Stripper, 7½-Yd. Loader and 25-Ton Trailers Used—Dams, Ditches and Pumps Handle Water—Electrical System Completely Protected

WITH a 33-cu.yd. shovel heading the equipment list, the new Flamingo strip mine of the Fairview Collieries Corp., Fairview, Ill., is producing over 4,000 tons of cleaned coal a day from 50-in. coal seam under an average of 40 to 45 ft. of overburden. The shovel is equipped with new-type controls for the swing and automatic leveling equipment. Auxiliary units include a "knee-action" loading shovel, 25-ton tractor-trailer haulage units, gas and electric coal and overburden drills, tractors, and scrapers, and a completely grounded and protected electrical distribution system. Drainage is handled both by pumps in the pit and dams and ditches on the bank. The coal is prepared for shipment in a new washing, screening and drying plant with five tracks.

Construction at the Flamingo property began in 1941 and the first coal was shipped in January, 1942. The company is a wholly owned subsidiary of the Ayrshire Patoka Collieries Corp., which was developed from the Electric Shovel Corp., organized in 1926. This concern originally operated three mines in Indiana and in 1928 started an expansion program which included acquiring acreage in Fulton County, Illinois, now operated by Flamingo.

Electric Shovel was placed in receivership in 1931. By June 1, 1938, all obligations had been paid and the company discharged. Robert P. Koenig was elected president and J. B. F. Melville continued as vice president and general manager. In 1939, a consolidation was effected with the Patoka Coal Co., the new organization taking the name of the Ayrshire Patoka Collieries Corp., operating four mines in Indiana, of which Patoka and Ayrshire mines are the largest.

Fairview Collieries Corp. was organized in 1941 to develop the Fulton County acreage and produce 800,000 to 1,000,000 tons annually. In addition to Messrs. Koenig and Melville, J. W. McDivitt is preparation manager, Robert K. Beacham is general superintendent, and Richard A. Swallow is chief engineer. The staff at Flamingo, served by the Minneapolis & St. Louis and the Chicago, Burlington & Quincy R. R., includes George D. Huff, superintendent; Raymond Pyle, pit foreman; J. A. Maher, tipple foreman; John C. Brydon Jr., assistant tipple foreman; Fred Greenbank, chemist; and Ellis Maxwell, chief electrician.

Flamingo production comes from a 2,300-acre tract of Illinois No. 5 coal. Average seam thickness is 50 in. Average thickness of the overburden is 40 to 45 ft., with the maximum approximately 65 ft. The acreage was prospected by drillholes on the corners of each 40 acres. While subject to variation, the coal usually

is overlaid by a few inches to 2 to 3 ft. of slate, followed by up to 3 ft. of limestone and 30 ft. of sandy shale and surface. Under usual conditions, about half the average 40- to 45-ft. bank is made up of slate and shale.

The goal under usual conditions is a pit width of at least 90 ft. Width of the shovel cut, however, is 50 ft. ordinarily, sometimes dropping to 40 to 45 ft. when conditions are abnormal. As might be expected, the overburden must be shot, and for this purpose two sidewall drills are employed, one a "Parmanco" gasoline machine with hand feed (to be changed to power feed) and the second a homemade electric unit. These drills make 5-in. holes in the slate usually found over the coal. Where this slate thins, it sometimes is necessary to drop the holes nearly down to the coal to get under the limestone.

Hole Loading 150 Lb.

Holes generally are spaced on 35-ft. centers. Depth usually is 45 ft., which, with the 5- to 10-ft. breakback normally achieved, provides the requisite cut width. A 30-percent gelatin has been decided upon for future shooting, which automatically takes care of wet holes. It will be bought in 3½x16-in. cartridges, compared with the 4-in. cartridges previously used, to ease the problem of loading the holes. The standard charge is 150 lb. per hole, which does a good breaking job under Flamingo conditions.

The Flamingo stripping unit is a Bucyrus-Erie 1050-E electric shovel with 33-cu.yd. welded "Man-Ten" dipper. Boom length is 113 ft. Total length of the dipper handle is 75 ft.: effective operating length, 64 ft. Ropes are American Steel & Wire. The dipper is prevented from chilling in cold weather—thus preventing the possibility of cracking as well as easing the cleaning problem—by Calrod heating units—four at 2 kw. on the top and two on each side. Plans for installing similar heating units in the cylindrical handle are under consideration.

The shovel is powered by a 1,000-hp. 3,810-volt synchronous m.g. set. Generating equipment, supplying nominally 250 volts d.c., consists of two 225-kw. hoist generators; two 112½-kw. swing generators and one 112½-kw. crowd generator. A 35-kw. exciter is provided. The four crawler units are powered by 75-hp. 220-volt a.c. motors. This low voltage was selected because such motor equipment, it is felt, is better able to withstand moisture.

Warning bells and limit switches are provided for the crowd motion, and these also take care of the movement of the 145-ton dipper counterweight. In other words, if the dipper handle is run too far in either direction, the operator is warned by a signal bell, which is backed up by limit switches to cut the power off the m.g. set.

The swing motion on the shovel is equipped with Westinghouse "Rototrol." This control operates through the medium of manual adjustment of resistances regulating the field current of an auxiliary generator that in turn excites the fields of the swing generators. By thus modifying the current to the swing motors, a highly flexible and responsive swing control is provided, speeding up acceleration and deceleration and reducing wracking and straining of the shovel. Automatic leveling is provided by a system built around mercury switches.

The stripping shovel normally is accompanied by an International I-4 rubber-tired tractor with Baker bulldozer. A large TD-14 tractor with Bucyrus-Erie bulldozer is available for rough cleaning and other duties. For road building and ditching, the mine employs a TD-18 machine and 10-cu.yd. Bucyrus-Erie scraper. This equipment, plus additional units and two draglines, was employed in build-

This Flamingo shovel with 33-cu.yd. dipper is equipped with new swing controls and mercury-switch automatic leveling.

25-ton semi-trailer being filled by the 7½-cu.yd. loading shovel.

ing the railroad grade into the plant, which involved moving 325,000 cu.yd. of material over the 4½-mile route. Grading and laying the tracks, including construction of five bridges with a total of 400 ft. of trestle work, was done by the coal company's operating force. Work started April 10 and the spur was completed Aug. 1, working 24 hours a day.

Two Hardsocg vertical coal augers are employed in drilling the coal at Flamingo. Holes are put down on 6- to 7-ft. centers and are shot with pellet powder.

The loading unit at Flamingo is a Marion 4121 "knee-action" shovel with 7½-cu.yd. dipper and Ward Leonard control. It is powered by a 275-hp. 3810-volt linestart induction motor driving a 165-kw. hoist generator, 27-kw. swing generator and 34-kw. crowd generator. Motor horsepowers are: hoist, 187½; swing, 37½ hp.; crowd, 30 hp. Operating voltage is nominally 250 d.c.

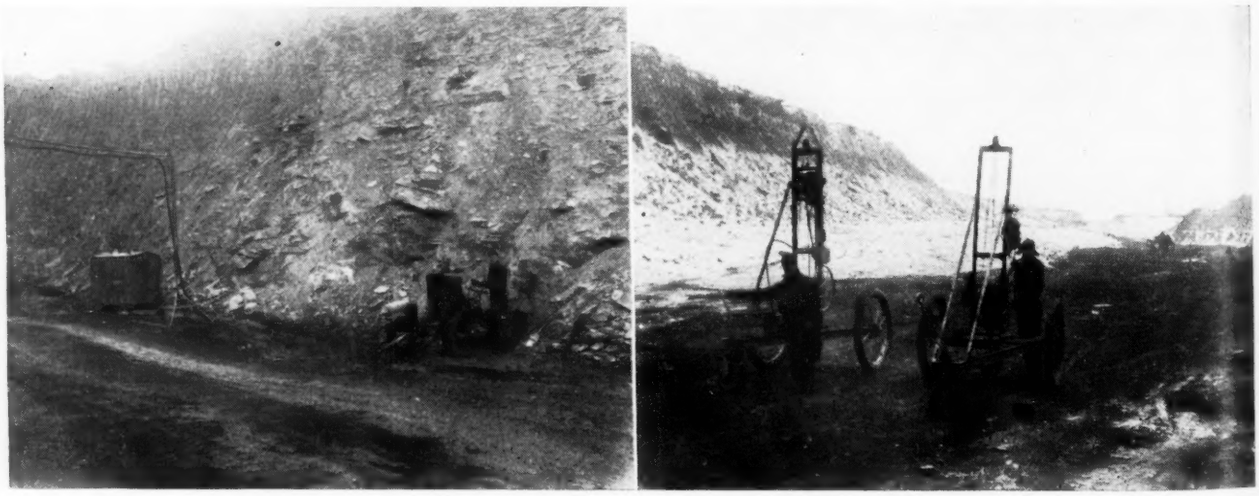
Coal is hauled to the preparation plant in 25-ton Austin-Western trail cars pulled by Dart tractors powered by Hercules 6-cylinder 200-hp. HXE gasoline engines. Six of these units are in service, and are supplemented by two Dart end-dump gob trucks (15 tons of gob or 13 tons of coal), which bring preparation-plant refuse out to the pit and take coal back. The haulage equipment operates mostly on the coal, except for an entrance road into the pit, constructed of 2x3-in. crushed limestone surfaced by 1x3-in. material. Mileage per gallon of gasoline usually falls in the range of 1¼ to 1½. A steel building with galvanized siding and roofing serves as a garage and for minor repairs.

Keeping it away from the pit and thus reducing the bother and work of pumping it is the watchword in handling water at Flamingo. The basic provisions are dams in ravines plus main ditches to carry accumulations to the nearest stream or other disposal point away from the pit. The ditches are supplemented by subditches, from which 4-in. self-draining pipelines are laid to points near the high wall. The pumps in the pit feed to hose lines which are connected to these pipes, or, if the sub-ditches are close enough, may run directly to them. As the high wall advances, lengths are taken off the pipelines as necessary, and eventually the lines are laid to new ditches. Pit pumps are kept set at strategic locations all the time, hooked up and ready for operation. They comprise three 4-in. and one 2-in. Fairbanks, Morse trash pumps and one 2-in. Jaeger gas machine.

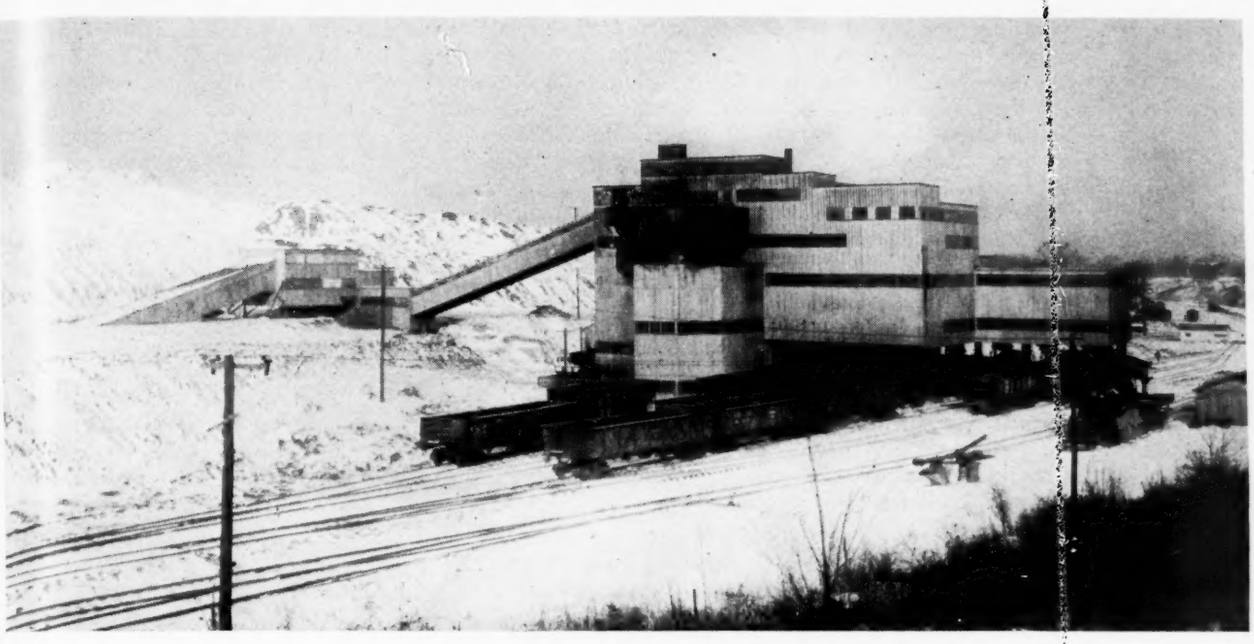
Power to operate the Flamingo pit equipment and preparation plant is bought from the Central Illinois Power Co. Complete protection for both men and equipment is provided. From the main substation, where it is reduced from 33,000 to nominally 4,200 volts, a.c. is conducted to cable junctions near the high wall by pole lines. A hill cable is provided for taking the power on to the pit. This hill cable comes off a pole line through disconnects and is divided into two sections. Additional sections may be added if desirable, but the two in service normally provide for all moves from one pole line to the next. One run of about 300 ft. leads into a disconnect box. Provision also is made for hooking on a circuit for low-voltage transformers, if desired, through fused disconnects. From the box, a 350-ft. length of cable runs to a Westinghouse steel-clad skid-mounted switch and junction house in the pit. This house normally serves the stripping and loading shovels (Westinghouse generators, motors and controls) and also the transformers supplying 440-volt power for drills, pumps and other auxiliary equipment.

The hill cable enters the switch house through a circuit breaker, which is set lighter than the main breaker in the substation so that trouble in the pit will not knock off the entire system, including the preparation plant. The cable feeding the stripping shovel (2/0 conductors) is taken off through disconnects and Miller connectors. In addition, two banks of fused disconnects and the necessary connectors are provided for serving the loading shovel (No. 6 wires) and the pit transformers. The switch and junction house also contain circuit-protective equipment, including switches and ohmmeters for testing ground circuits.

Cables are of the SHD type. Each conductor is shielded and these shields are in contact with a fourth ground wire, which is carried back through all the switch and junction stations to the main transformer station. Grounding along the pole line is accomplished by drilling down below the coal to make certain of proper earthing conditions. Protective equipment consists of a resistor and reactor in the main substation to limit potential to ground to 50 volts in case of a fault anywhere over the system, whether at the pit, preparation plant or other point, thus reducing the danger to men. Further protection is afforded by the use of 200/5-amp. current transformers and instantaneous relays to trip the circuit breakers in case of ground or unbalanced currents.



One of the two overburden drills in action at Flamingo. At the left is a steel-clad switch and junction house for the pit equipment; drilling the coal preparatory to shooting and loading.



Flamingo preparation plant. Left is the "inspection house" for preliminary picking and breaking. Right is the main plant, including washing and drying equipment.

WASHING AND DRYING
Feature New Flamingo Preparation Plant

Primary and Rewash Units Clean All Coal Under 6-In.—Sizes Under 1¼-In. Heat-Dried—Complete Crushing, Screening and Mixing Facilities Provided—Coal Quality Assured Through Laboratory Controls

WASHING of all coal from 6-in. down, with crushing and rewashing facilities for middlings, and heat-drying of 1¼-in. x ½-mm. are among the outstanding features of the 600-tons-per-hour preparation plant serving the new Flamingo mine of the Fairview Collieries Corp., Fairview, Ill. Production equipment at Flamingo (see article beginning on p. 56 of this issue) includes a 33-cu.yd. stripping shovel, 7½-cu.yd. loader and 25-ton tractor-semi-trailer haulage equipment. Pit and preparation equipment together turn out over 4,000 tons of cleaned, dried and prepared coal per day. First coal was shipped over the Minneapolis & St. Louis R.R. in January, 1942.

Five loading tracks, each with boom, are provided at Flamingo, which also is featured by an "inspection house" where preliminary picking and breaking are done. Additional final picking facilities are provided in the main plant, along with raw-coal screens, washed-coal classifying screens and a highly flexible crushing and sizing set-up, using vibrating screens, for the production of stoker and other smaller coals. Complete mixing facilities, a testing and control laboratory and up-to-date weighing and billing equipment round out the equipment for shipping a uniform quality product.

Flamingo production comes from the Illinois No. 5 seam, averaging, at this property, 50 in. in thickness under an average of 40 to 45 ft. of overburden. Sulphur, horsebacks, fireclay and certain other extraneous material are the major impurities and the coal as a whole does not present an unusually difficult washing problem. The plant was designed and built by McNally-Pittsburg. One wash box is provided for 6x2-in. coal, a second for 2x0 and a third smaller rewash unit and crusher for the middlings. The quantitative efficiency of the plant, taking into consideration the float in the refuse and the yield for the day, is calculated at approximately 99.5 percent.

Raw coal is received from the pit in a 200-ton concrete hopper with steel plate on the flare from the feeder throat to facilitate movement into the feeder. Seepage water is handled by a 2x2 vertical bilge pump under the hopper with self-contained float-switch control. The feeder is a reciprocating unit, supplemented by a contact plate over the discharge so that when any big chunks hang up, a light goes on in the inspection house as a signal. A switch in the inspection house permits stopping all equipment to the raw-coal belt to the main plant so that the feeder may be cleared. When the chunk is removed, the operator in the inspection house is advised to restart through a signal system. The feeder is operated

through a Reeves variable-speed drive to permit the washery operator to vary the rate of feed as desired.

From the feeder the raw mine-run goes onto a 60-in.-wide belt conveyor 204 ft. long horizontally and 55½ ft. vertically between pulley centers. The width of the 5-ply 42-oz.-duck U. S. Rubber "Matchless" belt is 60 in. Splices are vulcanized.

The inspection house, where preliminary picking and breaking is done, is staffed by two men and an oiler, the latter taking care of all equipment to the end of the belt feeding the main plant. Mine-run brought up by the 60-in. belt is dumped onto bars of railroad steel to remove minus 6-in. material, which is bypassed into the mine-run breaker. Plus 6-in. coal is passed over a shaking picking table for removal of large niggerheads (sulphurs), which are chuted into "Load-Lugger" buckets for hoisting into a truck for disposal. After picking, the plus 6-in. coal drops into the preliminary breaking unit, a McNally-Pittsburg 30x60 double-roll adjustable crusher, where it may be reduced as desired to a top size from 10 in. to 6 in., depending upon the market situation.

Lump Hand Picked

The crusher discharges to the belt conveyor feeding the raw-coal shakers in the main plant. This conveyor is 160 ft. long horizontal distance with a vertical rise between pulley centers of 51¾ ft. Width of the 5-ply 36-oz. duck belt is 48 in. This belt discharges to a raw-coal shaker (two sections) 8 ft. wide and approximately 63 ft. long, including a picking table on the lower end of the lower section. After picking, the 6-in. lump or oversize can be crushed by diverting it into a 24x48 single-roll adjustable crusher under the table, the crushed product going to the coarse-coal washer. If crushing is not being done, however, the lump or oversize goes into a drag-chain lowering conveyor which takes it down either to the washed-coal classifying screen or to the bottom run of the mixing conveyor.

In addition to 6-in. lump or oversize, the raw-coal shakers also produce 6x2- and 2x0-in. sizes, with provisions for making a 1¼x0-in. raw screenings for direct loading, except for a limited portion of ⅜x0 taken out for washing. When the first flop gate in the raw-coal screen is closed, all the 1¼x0 joins the 2x1¼ for delivery to the 2x0 wash box. The 6x2-in. coal is washed in a McNally-Norton 522-EE box with two primary and two secondary cells; 2x0 in a 523-EE box with two primary and three secondary cells. Middlings from both boxes may be bypassed directly to the refuse conveyor when difficulty arises in this circuit. Usually, however, they are run to a 24x48 double-roll crusher which reduces them to approximately minus 1 in. for rewashing in a 3030-F three-cell box.

Washed-Coal Screening

Clean coal from all three boxes is flumed with the water to a two-section washed-coal classifying screen 8 ft. wide and approximately 57 ft. long. This screen also receives lump from the picking table, as previously described. The classifying screen produces 4-in. lump, 6x4, 4x2, 2x1¼, 1¼x⅝ and minus ⅝ plus water. Sizes over 1¼ may be loaded directly or run into the mixing conveyor for making combinations or for transportation to auxiliary crushing and screening facilities. When it is to be broken down, such coal first goes into a 36x60 double-roll crusher with interlocking teeth for reduction to nominally minus 1¼. The crusher feeds to a gravity-discharge conveyor, which puts the crushed product onto two 5x14-ft. Allis-Chalmers "Ripl-Flo" vibrating screens making plus 1¼ oversize, 1¼x¾ and minus ¾. The oversize, with or without the 1¼x¾, may be broken to minus ¾ in two 24x36 double-roll crushers, and then sent on to the loading and mixing equipment or to two additional 6x14-ft. "Ripl-Flo" units for further screening to plus 1, 1x⅜ and ⅜x0 sizes for loading or mixing as desired (see accompanying flowsheet).

The 1¼x⅝ and ⅝x0 sizes made on the washed-coal classifying screens normally are heat-dried, although both may be bypassed for loading 1¼x0 wet when desired. The 1¼x⅝ goes directly to the conveyor to the heat-drying plant, from which conveyor it can be taken off to the mixing conveyor or loading boom. The ⅝x0, however, first is passed over two 6x20-ft. high-speed dewatering shakers fitted with 120 sq.ft. each of ½-mm. wedge wire. Minus ½-mm. and water go to the settling cone for treatment and eventual disposal as outlined later in this article.

The Flamingo heat-drying plant consists of three McNally-Vissac down-draft thermal dryers with the necessary furnace and exhauster equipment, effluent pumps and other auxiliaries. One No. 6620 dryer about 5½ ft. wide and fitted with 110 sq.ft. of stainless-steel wire-mesh screen, not over 100 tons per hour capacity, is provided for the 1¼x⅝ size. Two No. 7520 dryers (6 ft. 3 in. wide, 125 sq.ft. stainless-steel wedge wire, ¾-mm. slot openings, 150 tons per hour total capacity) are provided for drying ⅝x0. All dryers are equipped with fire-protection sprays inside the hoods.

Hot gases for dryer operation are supplied by a Reintjes suspended-arch supported-wall furnace (steel jacket with firebrick lining) fired by three McNally-Pittsburg spreader stokers. A bypass stack is provided for emergency use. The fuel normally is ⅜x0 dried coal, although provision is made for using 1¼x0 also, if desired. Hot gases are pulled down through the coal beds in each fine-coal dryer by 78-in. heavy-duty exhausters driven by 100-hp. 1,200-r.p.m. motors through V-belts. A 60-in. exhauster with 60-hp. motor serves the coarse-coal dryer. Dryer effluent flows into a catch basin supplemented by a 4x6 McNally-Pittsburg slurry pump, float-switch controlled, which pumps it back to the fine-coal dewatering screens, if desired, or through a bypass valve, to the settling cone.

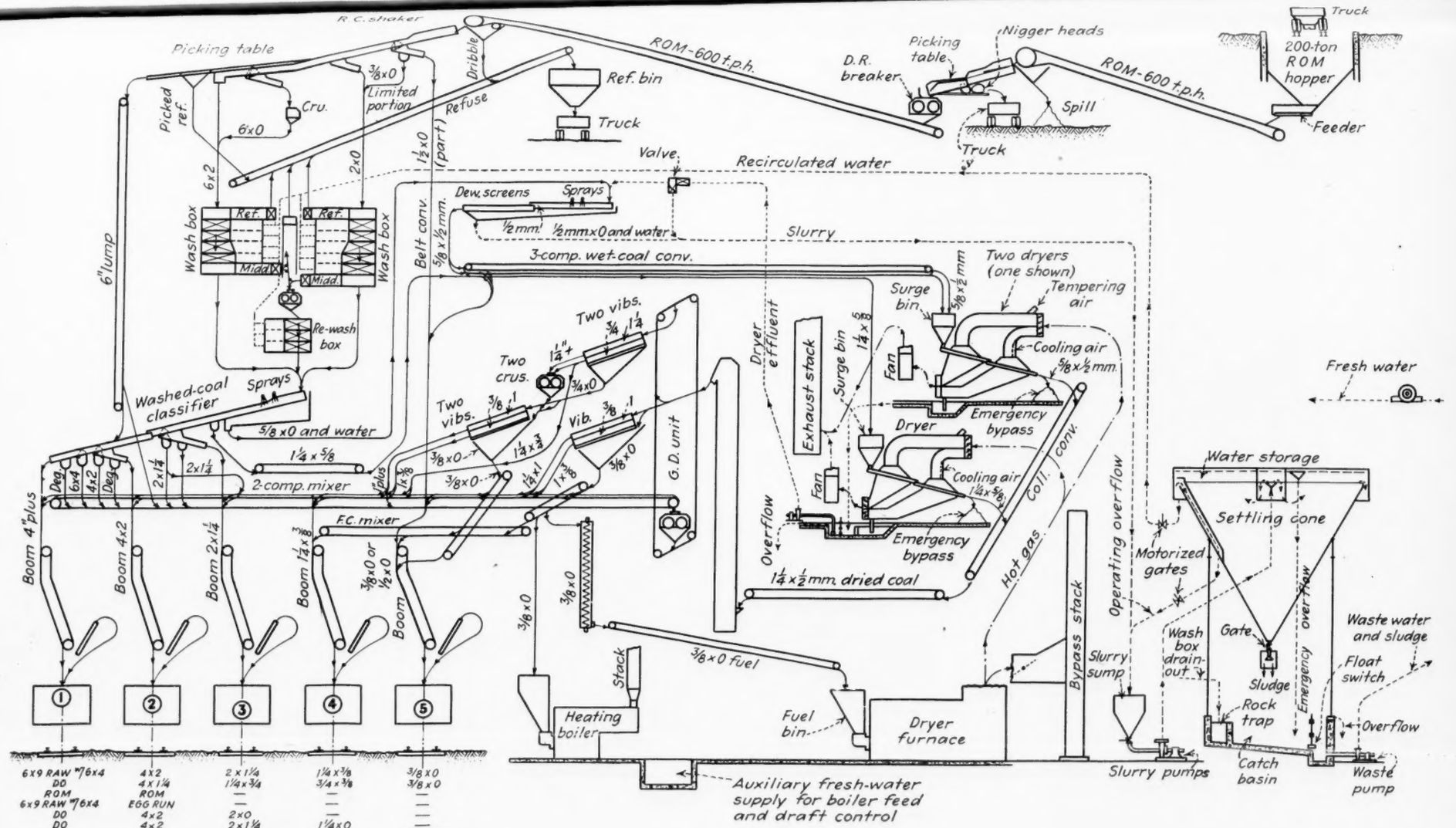
In addition to openings for tempering air, all three dryers are designed so that cooling air can be admitted to the lower screen sections. Emergency bypasses are provided for dumping the dryers in case of breakdown of conveyors or other equipment handling dried coal.

Surge Bins Precede Dryers

The dryers are preceded by surge bins to which the wet coal is brought on the top run of a three-compartment conveyor. One compartment handles 1¼x⅝ and the other two ⅝-in.x½-mm. The conveyors were rebuilt to provide the two compartments for the fine size and thus insure an even size distribution to the surge bins and fine-coal dryers. Considerable segregation had been experienced when both bins were supplied from only one compartment.

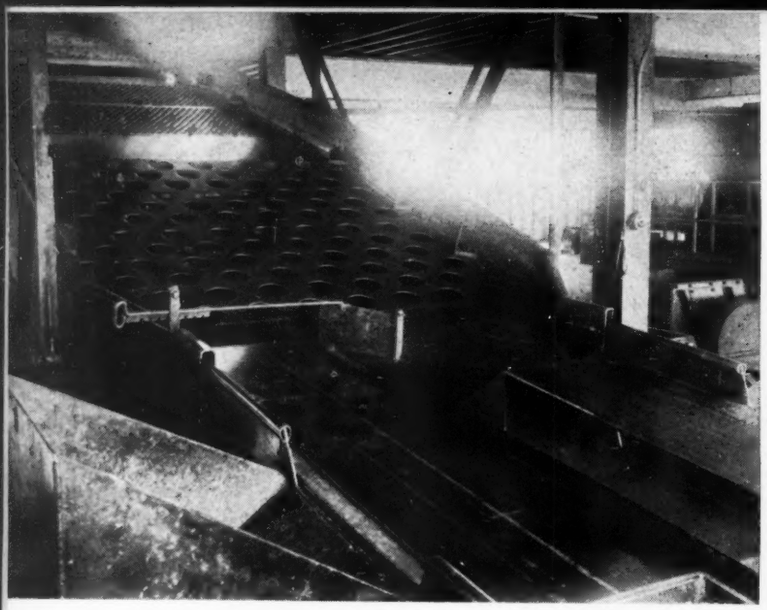
Typical temperatures in the various stages of the drying cycle are: hot gases at the furnace outlet, 1,000 to 1,040 deg. F.; at dryer louvres, 950 to 980 deg.; over the upper dryer sections, 800 to 820 deg.; over the lower sections, 770 to 820 deg.

Total seam moisture is 17 to 17½ percent at Flamingo. Total moisture in the wet 1¼x⅝ feed to the coarse-coal dryer usually is 18½ to 19 percent. Total moisture in the dryer product is 16.2 to 16.4 percent as a general rule. The ⅝-in.x½-mm. feed to the fine-coal dryers generally carries a total moisture of 24 to 24½ percent.

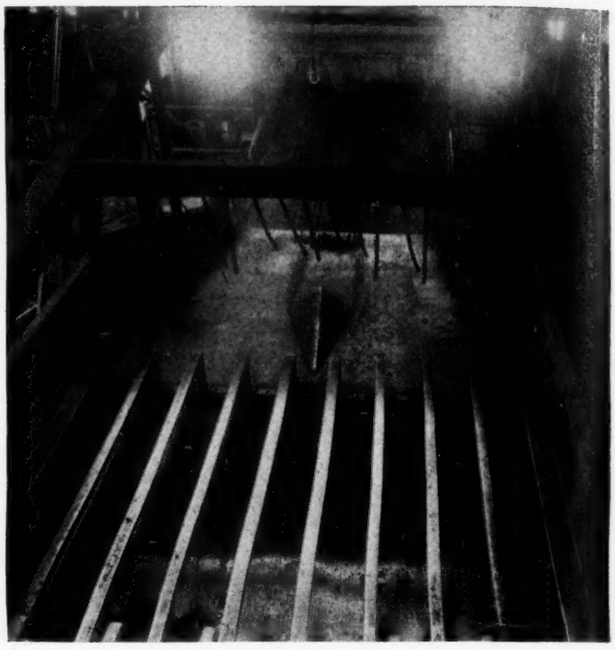


6x9 RAW "/6x4	4x2	2x1¼	1¼x⅜	3/8x0
DO	4x1¼	1¼x¾	¾x⅜	3/8x0
ROM	ROM	—	—	—
6x9 RAW "/6x4	EGG RUN	—	—	—
DO	4x2	2x0	—	—
DO	4x2	2x1¼	1¼x0	—
DO	4x2	2x1¼	—	1½x0 RAW
DO	CRUSH	CRUSH	1¼x0	1½x0 RAW
DO	CRUSH	CRUSH 2x1¼-LOAD 1¼x⅜	⅜x0	1½x0 RAW
DO	CRUSH	CRUSH 2x1¼-LOAD ¾x⅜	⅜x0	1½x0 RAW
DO	DO	2x¾	¾x⅜	⅜x0
DO	4x2	CRUSH 2x1¼-LOAD NAT. 1¼x⅜	⅜x⅜	⅜x0
DO	4x2	LOAD 2x1¼-CRUSH 1¼x¾	¾x⅜	⅜x0
DO	CRUSH	CRUSH	¾x⅜	⅜x0
DO	CRUSH	2x1¼	1¼x⅜	⅜x0
DO	4x2	CRUSH	1¼x⅜	⅜x0
WHEN ROM IS CRUSHED TO 6"MINUS AND WASHED THE FOLLOWING IS ADDED TO THE ABOVE SCHEDULE:				
6x4	4x2	2x1¼	1¼x⅜	⅜x0
CRUSH	4x2	2x1¼	1¼x⅜	⅜x0
CRUSH	CRUSH	CRUSH	1¼x⅜	⅜x0
CRUSH	CRUSH	CRUSH	1¼x0	1¼x0

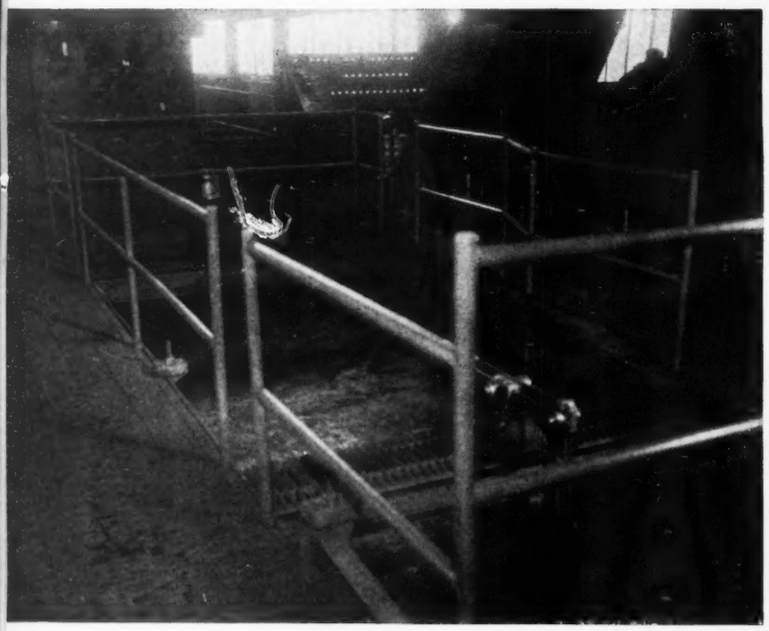
How coal is washed, screened, dried and loaded at Flamingo.



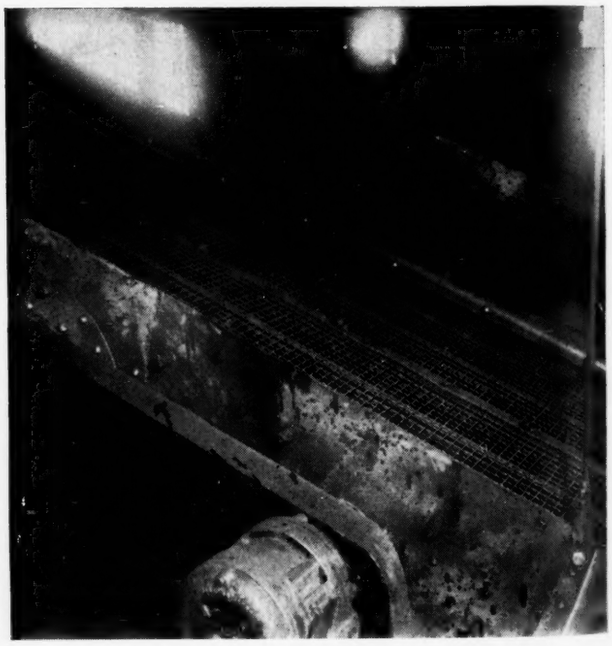
A picking table for lump or oversize is attached to the lower end of the raw-coal shaker in the main plant.



After passing over these bars, niggerheads are picked out of the lump in the inspection house. The coal then goes into the crusher in the far background.



This one of two automatic washers cleans 2x0 coal. In the rear is one of the two console-type pushbutton control panels.



Highly flexible crushing and rescreening facilities for making stoker and other small sizes includes the vibrating screens shown, which precede the preliminary crushing units.

To get the "squeal out of the pig," Flamingo crushes all middlings and rewashes them in the equipment shown.

The figure for the dried product is 18 to 19 percent. In the case of 1¼-in. screenings made by mixing the two, the weekly averages run from 16.5 to 17.5 percent total moisture.

The dried coal is discharged onto a scraper-type collecting conveyor and from there can go by means of a second conveyor and elevator to the gravity-discharge conveyor feeding the crushing and vibrating-screen installation previously described. Normally, however, the elevator discharges the dried coal to a 6x16-ft. double-deck "Ripl-Flo" screen, where it is separated into 1¼x1, 1x⅜ and ⅜x0 fractions for loading or mixing, as shown in the accompanying flowsheet.

All loading, as stated, is done over booms at Flamingo. These booms are fitted with pantograph chutes for changing cars, which are controlled by McNally-Pittsburg automatic-rewind retarders with air snubbers. Loaded cars are weighed on a Winslow scale with Streeter-Amet automatic recording equipment.

Minus ½-mm. slurry and water flows to a slurry sump at Flamingo and then is pumped up to a settling cone by two 12x12 McNally-Pittsburgh slurry pumps. Clarified water in excess of requirements to feed the wash boxes returns to the slurry sump. The cone is designed to provide a head of 18 ft. on the wash boxes, but a throttling valve in the line to the 2x0 box has been found helpful in its operation and in preventing flooding of the dewatering screens.

Slurry settling to the bottom of the cone is pumped to disposal ponds by a 6x4 Ni-Hard-fitted centrifugal pump. A rock trap for use in cleaning out the boxes and a catch basin for emergency cone overflow and casual water supplement the cone installation. A 4x6 V-belt-driven waste pump with float-switch control is provided for moving water and sludge out of the catch basin to the disposal points.

Fresh make-up water is introduced into the plant through sprays over the washed-coal classifying and dewatering screens. This water is derived from ponds used both for clarifying slurry water pumped out of the plant and for catching and storing rain and snow water. One reserve pond lies east of the plant. Slurry, when this pond is used, is pumped behind an upper dam, clear water overflowing into space behind a second retaining dam. Clear-water pumps for both this and the main ponds are 4-in. Fairbanks, Morse Fig. 5814 units.

Normally, however, the slurry is pumped back to the upper of two ponds in the spoil. The line is constructed of 6-in. spiral riveted pipe, and to help the pump out the line was lengthened over a hump to provide a siphon effect. From the upper pond the water flows around through a long valley to a lower storage pond, in the course of which it is clarified. From the lower pond the water is pumped back to the plant through 8-in. Transite pipe.

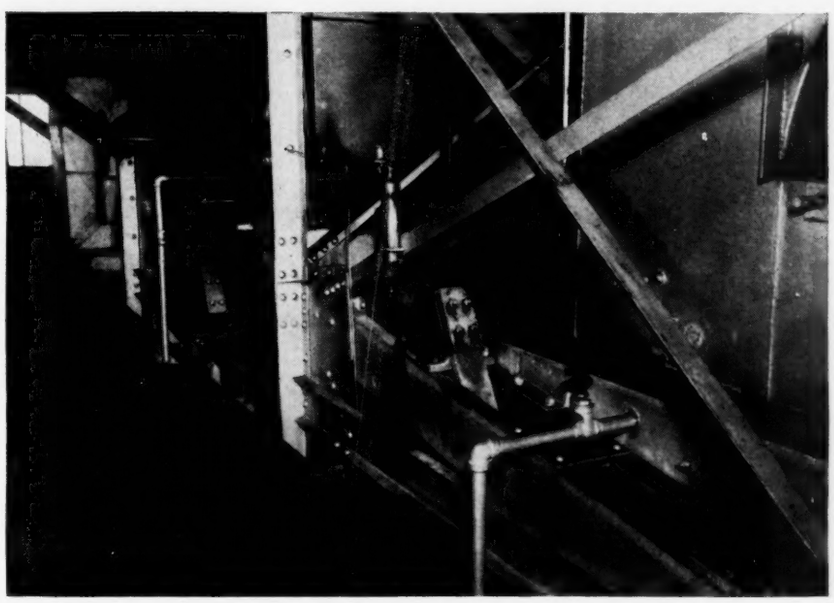
78 Motors Installed

Excluding small unit heater motors and similar equipment, the Flamingo preparation plant is operated by 78 motors totaling some 1,775 connected horsepower. The largest is rated at 125 hp. Mostly supplied by Allis-Chalmers, the bulk of the motors are ball-bearing squirrel-cage units, with splashproof types installed in locations where water is likely to be present. The operating voltage is 440; lighting, 110 to 115 volts. Fluorescent lamps are used for picking. All circuits are carried in conduit, usually to the motors. Four console-type pushbutton-control stations are provided, one in the inspection house, one for the drying equipment, one for the washing and screening section and one for the loading booms. Magnetic starters are used.

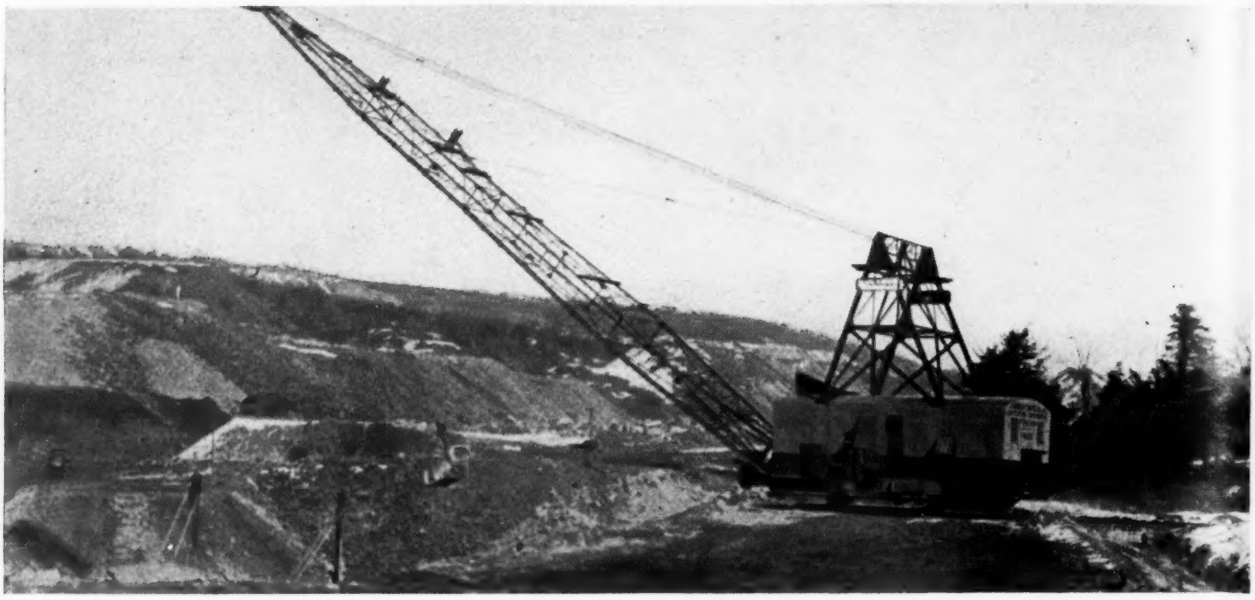
Steel and concrete construction with galvanized roofing and siding and welded pipe hand and guard rails characterize the plant. The structure is heated by a separate boiler with Iron Fireman spreader-type stoker. ILG unit heaters distribute the heat to the required points, maintaining a 60-deg. F. differential between inside and outside temperatures based upon 20-deg.-below-zero outside temperature.

A small laboratory for control work rounds out the preparation facilities at Flamingo. Major jobs, such as proximate and ultimate analyses and the like, are done at the Chinook laboratory in Indiana. Aside from simple ash and moisture equipment, balances and the like, the Flamingo laboratory therefore includes a Sturtevant crusher, Raymond fine grinder, Delatester and homemade testing screen. The latter is a small high-speed shaker with provisions for shifting plates to produce four sizes as desired. It is driven by a 3-hp. motor.

All sizes are sampled once an hour, with specials taken oftener when it is thought necessary. Routine samples are run for ash and moisture, and the unused portions are employed in making up a composite each week, which is sent to Chinook for proximate and ultimate analyses. The Flamingo staff, consequently, consists of a chief chemist and sampler.



Three thermal dryers (part of one shown here) remove excess moisture from 1¼-in.x½-mm. coal at Flamingo.



General view of walking dragline in St. Clair stripping.

WALKING DRAGLINE

Reclaims Coal Left in Civil War Work

St. Clair Coal Co. With Walking Dragline (8-Cu.Yd. Bucket and 200-Ft. Boom) Takes 60 Ft. of Cover From Top Bed—A Small Shovel Then Lifts This Bed, a Thick Divider and the Big Main Seam

WHEN, in 1937, the St. Clair Coal Co. leased from the Philadelphia & Reading Coal & Iron Co. a large area adjacent to its coal property at St. Clair, Schuylkill County, Pennsylvania, preparations were made by J. Robert Bazley, Inc., the stripping contractors by whom the coal of that company formerly had been stripped, to employ a large walking dragline in the removal of the overburden of this larger coal territory.

The area the Bazley corporation had been stripping lay to the west of the newly leased, or east, area and had been practically exhausted by both underground workings and strippings. When operated by the Philadelphia & Reading, the eastern area was known as the Pine Forest property, being worked from a shaft of that name. This area, which has never been second-mined, was not subjected to mechanical stripping until 1941.

The old St. Clair territory is frequently described as the old, or west, basin, but the so-called new basin really is part of the old one, from which it has been torn by a faulting action that has lifted the coal in the eastern area so high that the Skidmore bed that furnished an important quantity of coal in the western part of the basin and which underlies the Mammoth bed, which is being stripped, does not appear near the surface within the confines of the eastern property. The fault is not a straight-angled slip but appears in the mine more as a pinching out of the beds on the eastern fringe of the western area, a condition that seems characteristic of the faults in the anthracite region, possibly because the beds pitch so heavily.

In the new area, the coal being stripped is the Mammoth bed, the lower, or main, split of which is from 16 to 23 ft. thick. The upper split is separated from the lower by a divider of soft slate and soft sandstone 5 to 10 ft. thick. The coal thickness of this upper split varies from a few inches to 6 or 7 ft., and so in some places it is not worth recovering. But the overburden of the upper split is harder and some strata are even conglomeratic.

Below the lower split of the Mammoth are about 100 ft. of strata underlaid by the Skidmore bed, which is 9 or 10 ft. thick. This coal was mined near the outcrop in the original St. Clair property, first by undermining and then, much later, by stripping. Only the upper 5 ft. was taken by the miners because they were admonished to load only the coal that could be collected with rakes having 2-in. spaces between tines. Two such rakes have ben found in the old Pine Forest mine workings and in an excellent state of preservation.

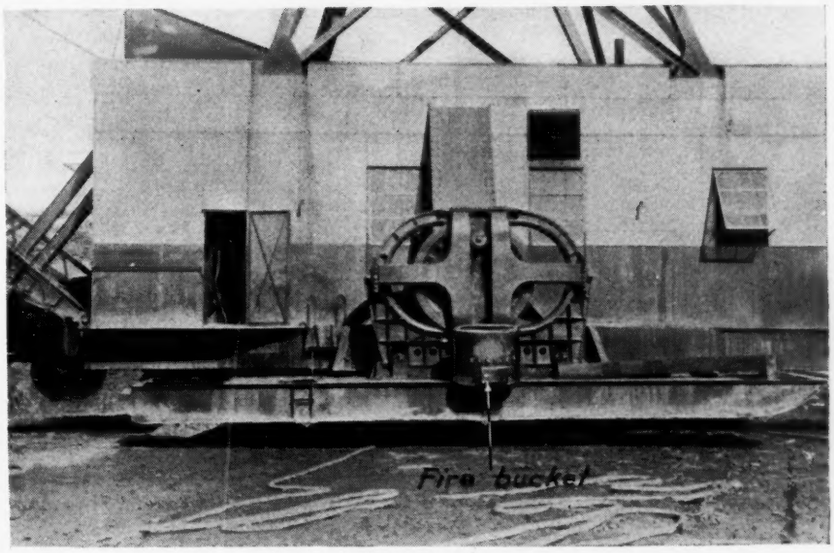
As the lower part of the seam was not sufficiently coherent, if they had mined it it would have been necessary for them to discard most of the coal, for both domestic and industrial users then were demanding large coal. In removing by stripping the older and shallower workings, the pillars were

found to be smaller than those left at a later date, and the workings contained rejected coal of a size that would pass through the spaces between the tines of the rakes, so the quantity of steam-size coal is somewhat in excess of that found in coal from underground mining or from strippings operated above either virgin coal or coal first mined at a somewhat later date.

At the point where the stripping dragline is working, the coal seam pitches south 25 to 30 deg. in the same direction as the ground but far more steeply, so that the coal soon gets too deep for stripping and only two stripping cuts can be made. In some places, the inclination of the seam exceeds even 30 deg. The first cut at the present location was made in an easterly direction along the northern slope of the valley and was carried down to the top of the upper split of the Mammoth and all the material stripped by the dragline was cast to the north toward the top of the hill.

As the covering of the split was removed, the upper split, the divider below it and the lower split were loaded in turn into trucks by a Bucyrus-Erie 52-B dragline having a 60-ft. boom and a 3-cu.yd. bucket, which originally had been designed for a 70-ft. boom and a 2-cu.yd. bucket. At present, the stripping dragline is making a return and final cut to the west, but this time it is casting the stripped material down the hill to the south, thereby covering the unstripped coal more deeply than ever, as all the rest of the coal is beyond recovery by stripping methods.

Eight-yard bucket discharging its load.



Walking mechanism with fire bucket to take frost out of castings in excessively cold weather.

The depth of this lift down to the upper split is 60 to 70 ft., and this material was drilled in October with 6-in. holes sunk by Loomis units and shot with American Cyanamid ammonium-nitrate low-freezing dynamite of 50-percent strength. This rock was blown straight up so that it would fall back, broken but in place. To lift this rock, 44,800 lb. (22.4 tons) of explosive was used which was fired at a single shooting by expert Cyanamid powdermen.

The big stripping excavator is a walking Bucyrus-Monighan Model 9-W, Serial 633, with a 200-ft. boom and an 8-cu.yd. bucket. Such excavators, large and small, are having much application in the anthracite region, as with them there are no caterpillars that may make trouble; in fact it is asserted that much complication of every kind is avoided by the use of the walking principle. Vibration also is said to be lessened because of the broad base on which the machine rests and because the machine does not tower to great heights but, as it were, nestles near the ground.

Moreover, it is asserted that because of this broad base, low gravimetric center and a decrease in height the walking dragline is well suited for operation on soft material or over old workings which have caved or may cave. Danger of upsetting is greatly reduced; in fact made entirely unlikely. The pressure of the machine on the ground is less than 9 lb. per square inch. A wide base assures a bridging between pillars and reduces the load to be borne by them and by rock falls.

Furthermore, the walking dragline has an ability to side-step in any direction made necessary by working conditions. This side-stepping also adds to its maneuverability. Stability and breadth of base also make feasible the use of a long boom that otherwise would destroy the machine's balance, and such a boom gives both greater radius of action (366 ft. without throwing the bucket) and a greater casting height.

An unusual feature of the 9-W all-electric dragline excavator is the extension of the fairlead about 15 ft. beyond the base of the revolving house, which is accomplished by building up girders bolted at the front of the revolving frame, a decided advantage in deep digging, for the base of the machine can be kept back on safe ground with the fairlead extending nevertheless well over the edge of the pit, allowing clearance and therefore less wear of the drag rope as it pulls in its load. Greatly increased hours of rope use has been obtained with this extended fairlead —and it has made possible going to much greater depths than hitherto was thought possible with this type of machine.

It is necessary to have a fairly level location and the machine in movement from place to place can travel at only about 0.15 m.p.h. Consequently, a reasonable continuity of operation with short—if any—flits is mandatory with such equipment. The dragline was erected on the location within a few hundred feet from the point where it is now working. The boom is built of four light steel angles stiffened with rectangles of tubing and

Fairlead pulley is set forward so that rope clears top of bank, reducing wear and permitting excavator to be set back on bank.

Bucket going to pit for its next load; 12- to 15-ton trucks waiting to be loaded with coal below.

with similar cross bracing, all substantially welded together.

A synchronous motor-generator set of 450 hp. at 0.90 power factor serves as the drive motor and the equipment has Ward Leonard control. The hoist motor is ventilated and is of 250 hp. and will run continuously for an hour at 230 volts with an increase in temperature limited to 75 deg. C. Ventilated also are the two 75-hp. motors for swinging the boom; these are guaranteed to raise their temperature only 23 deg. C. when continuously operated for an hour. Of course, neither is in operation at any time for more than a few minutes or parts of minutes. Power is received as 3-phase, 60-cycle, 2,300-volt alternating current.

Net weight of the dragline is 423½ tons with a working weight of 571 tons, 70 tons of which is ballast. It, however, has been loaded more heavily than prescribed, thus further steadying its operation.

Stability further is afforded by an outside diameter of the base of 30 ft. 10½ in., a bearing area of 748 sq.ft.; seventy-six 10-in. rollers support its weight. The revolving frame is 26 ft. 7 in. x 50 ft. 6 in. It can dump rock 115 ft. above ground level. When it moves forward, the two 5-ft.-8-in. cams on either end of the 17-in.-diameter center shaft push the 6x36½-ft. boat-like feet down on the ground, and the machine slumps forward like a man on crutches. The distance traveled by this step may be as much as 7½ ft., but only if the ground is level; if it is soft and slippery the progress made may be only 3 ft. Stripped coal is removed with a Lorain 77 shovel with a 19-ft. dipper stick and 1¾-cu.yd. bucket.

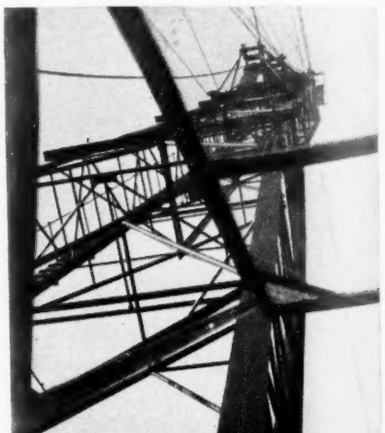
112,000 Cu. Yd. a Month

The walking dragline started its operation Jan. 27 of this year, and last month removed 112,000 cu.yd. of overburden. In the same month, 25,027 cu.yd. of coal was loaded in the area thus stripped. All the coal goes direct to the St. Clair breaker without preliminary cleaning.

J. Robert Bazley, Inc., makes its own bucket teeth at its main shop in Port Carbon, Pa. A small coal furnace has been constructed alongside the cams on either side of the shovel so as to prevent, in the winter, these important accessories from freezing. In another location where the maximum overburden is 80 ft., the Mammoth bed (here 22 ft. thick) is being stripped, the rock in the higher cutting being dropped to a handling level by use of explosives. A Bucyrus-Erie 54-B dragline with 90-ft. boom and a 2½-cu.yd. bucket is lifting this overburden, and the coal is being loaded by a Lorain 77 shovel with a 19-ft. dipper stick and a 1¾-cu.yd. bucket.

Excellent roads are maintained. These are built of big stone covered with broken rock. Insistence on even gradients entirely mud-free has made transportation easy and efficient. All the trucks used at this stripping are listed in an accompanying tabulation. They all are powered by diesel engines. No anti-freeze is used, but they are carefully housed at night in a long shed provided with an 8-in. steam pipe. When cold weather comes, this pipe is lowered into an open trench which the trucks straddle and sufficient steam is passed into this pipe that there is no possibility of freezing, the quantity of steam being gaged by attendants who watch the effect of the cold on water exposed in small pans about the shed.

The age of the eastern, or Pine Forest, operation is not known. The western, or St. Clair, operation dates back to 1826. A map of the eastern mine has been found dating back to 1845 and the keystone of an arch found at an old shaft on the property goes back to 1864, as testified by the date sculptured in the rock with the initials of the shaft's constructor, C. W. Snyder. The workings under the new, or east, stripping have not been active since 1890 but air still comes up the footwall and enters the open pit, a chimney effect which is characteristic of ventilation in all highly pitching seams.



From operator's seat on walking dragline looking up 200-ft boom.

TRUCKS AT ST. CLAIR STRIPPING

Truck	*Capacity Cu.Yd.*
One Mack-BM	7.7
One Mack Colonial	10.7
Two Mack Colonials	10.4
One Mack ER	7.0
Two Mack EQ	7.0
Two BQ Boulder Dam	8.0
One Mack FC Boulder Dam	11.0
Three C-60 International	7.0
Two C-60 International	3.0
Four DR-60 International	7.0
One 97 L Hug	9.3
One Euclid	9.0

CONVEYOR VENTILATION
Requires Ample Air and Positive Movement

Concentration Makes Inspection and Ventilation Easier—Dust in Air Current May Be Reduced—Blowers and Tubing May Serve Better Than Line Brattice — Installation and Care Important

By J. H. DICKERSON
Mining Engineer,
Huntington, W. Va.

WHILE the use of mechanical loading and conveying equipment to reduce cost and increase tonnage per man has been marked by rapid progress and substantial accomplishments, ventilation where such equipment is employed has not received the same attention as other aspects. Most companies are trying to work rooms mechanically from two-heading entries, the same as with hand loading into mine cars, but this number of openings is hardly sufficient. A few drive three, four or more headings for mechanical-loading sections. This article will attempt to show a plan for working four wide-face rooms in one section, designed to improve the ventilation, reduce the quantity of dust and the danger of an explosion, increase the efficiency of the workers and, probably, reduce the cost of the coal.

Wide rooms with hand loading into face conveyors are an advantage where the coal must be cleaned at the face and the refuse thrown back into the gob. With four rooms, 60-ft. faces, 4-ft. coal and two 6-ft. cuts, the production will be close to 450 tons per shift. The number of men required will depend upon local conditions, but it might be assumed that 25 will be employed in an area averaging about 1½ acres.

This is very concentrated mining and should make it easy for the foreman, fireboss or inspector to check for gas, see that the dust is not dangerous and make sure that the ventilation is good. The workings must be planned with that in view, however. While approved electrical equipment and explosives should be used, with sprinkling and rock-dusting as necessary, the ventilation should be sufficient to remove all flammable gas quickly and permit employees to work efficiently.

It should be understood that a section worked mechanically may develop methane where it was never noted before and that it will give off more of such gas than a section where hand loading into mine cars is the practice because of the more rapid advancement of the faces; also that dust is a hazard seldom encountered in hand loading into cars. Pockets of gas permitted to collect along the roof are especially dangerous when dust is present. In the past there have been many explosions which caught only one or two workers, but with concentrated mining an entire section is likely to be affected.

Can Hold Center Heading

Fig. 1 is a proposed plan in which two wide rooms with conveyors are worked on each side of a three-heading entry. Four rooms are shown completed. Usual depth of such rooms is 300 ft. They sometimes are 60 to 80 ft. wide on 90-ft. centers. This is ideal as far as loading is concerned, as the center heading usually can be held until the rooms are completed, by which time there is a sufficient area on timbers so that a fall probably could be obtained by removal of part of the timbers. In most seams, timber removal could be accomplished safely with post pullers and most of the posts used again. If the cover is not heavy and the roof is good it may not be necessary to relieve the roof pressure before driving the next four rooms to their limits. With this system, cross entries are driven on 650-ft. centers.

Conveyors may be used in driving the three-heading cross entries. The loading rate for narrow work usually is high, but this cost is offset in part by getting 50 percent more coal from the section before the rooms are started. Crosscuts are made on the same centers as the rooms and later serve as the necks. The crosscuts are staggered slightly so that room-conveyor discharges will not be directly opposite. Rooms are started from the outer sides of the outer headings and thus it is unnecessary to drive a place from the room neck before the wide work. This makes the amount of narrow work very little more than with the two-heading entry, and when the rooms are completed only two rows of chain pillars are left, compared with one row of chain pillars and two of entry stumps.

In using conveyors for driving the three headings it generally will be advisable to lay a temporary track for cars to take the coal coming from the faces over convenient lengths of conveyors. In driving the rooms the conveyors, C-1, 2, 3 and 4, discharge onto a belt conveyor delivering to cars on a main sidetrack.

For the mains, two intake and two return airways are shown. One of the latter might be omitted in a small area but two usually will pay and a second airway always is desirable to relieve the haulway and reduce air velocity, pressure, dust, etc. With the arrangement shown, the air velocity will be low where the cars are loaded and much of the dust which would be carried by the air current if there were but one heading at this point and no diagonal to the three-heading cross entry will go into the mine cars.

Wood stoppings sufficient for the life of the cross-entry should be placed in the crosscuts between the intake and return air—also to direct the air from the cross entry to a point beyond the automatic door indicated in the haulway. It probably will be advisable to use metal lath and plaster on one side of some of the stoppings to be used the longest. Wall plaster added to the cement in a proportion of 1:4 will make a tighter stopping if the place is not overly wet.

A check curtain, *C*, is placed in the middle heading of the cross entry outby the conveyor-discharge points. This deflects air to the left heading, where the blowers for tubing *B-1* and *B-2* are placed—about 15 ft. outside the line of the first room working on the left. There should be a check in

this room neck, which, it will be recalled, also is the crosscut between the center and left headings. A check also should be placed in the second room neck unless falls have blocked the air from crossing the center heading at a point ahead or there is a check in the left heading, as shown. Tubing *B-1* and *B-3* and Conveyors *C-1* and *C-3* may be put through wood stoppings and these should be fairly tight against leakage.

If the air is blocked ahead of the rooms being worked, the wood stopping next to *C-3* will have to be removed, but this will increase the dust carried by the return air current. These arrangements will direct the the main air to the blowers for tubing *B-3* and *B-4*. It is desirable to keep the main air current away from the belt conveyor where it is receiving coal so that very little dust will enter the return air current.

Some mining men would prefer to use line brattices and carry a continuous air current around the four working places. They contend that blowers are not always operated continuously and that blowers and tubing may not furnish a sufficiently positive air supply. Explosions have occurred, however, where line brattices were not kept tight or a section was taken down for removal of material or equipment. In any conveyor section where methane is likely to occur an inspector should be on duty at all times when men are working, whether the ventilation is by line brattices with a continuous air current or by blowers and tubing, to see that the ventilation is ample and that no dangerous quantities of gas accumulate.

If blowers are used, the inspector should see that they are properly located, that there is sufficient fresh air where they are placed, that the tubing is kept properly installed and repaired and that the blowers are kept in operation. A blower should be stopped while shooting is being done in the place it serves, but should be started promptly after any stoppage. It should have approved wiring and should be inspected and lubricated at regular intervals. In a gaseous section, it may be advisable to keep blowers running continuously even when the mine is idle and the outside fan is in operation, but at such times there should be some supervision.

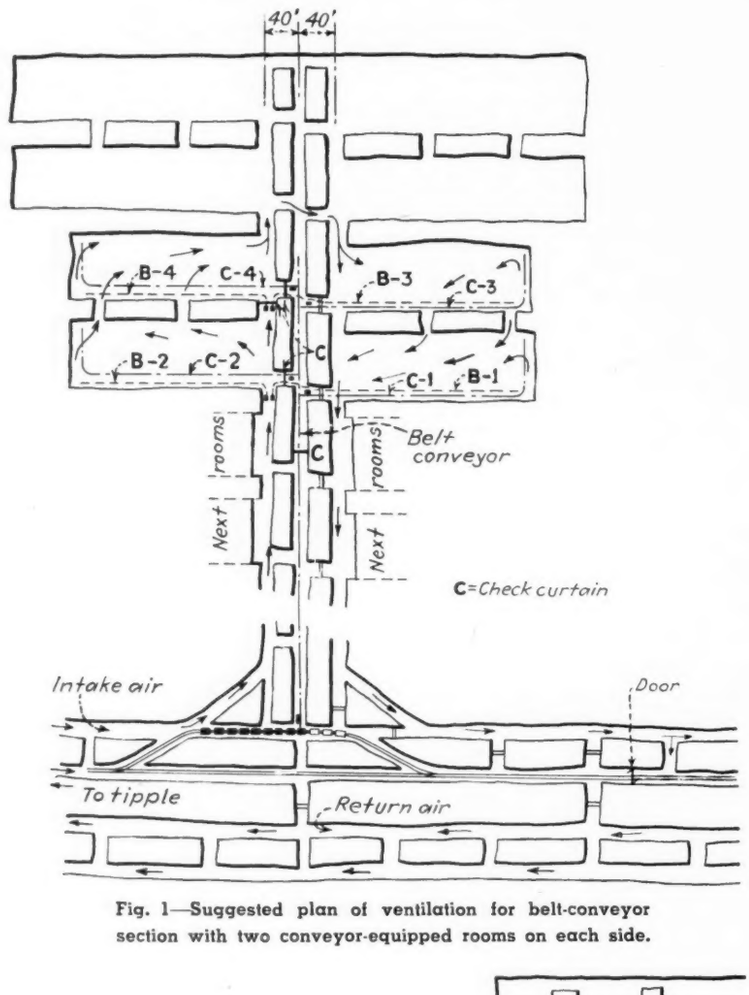


Fig. 1—Suggested plan of ventilation for belt-conveyor section with two conveyor-equipped rooms on each side.

Fig. 2—Plan of working and ventilating with four rooms off one side of the entry.

Split for Each Room

The use of blowers and tubing means a separate split for each room, and any gas collecting along the roof near the face may be removed quickly and will not have to pass to the other room faces. The tubing should be suspended and discharge near the roof. With 12-in. tubing and the proper quantity of air, the air stream will remain largely intact around the face where it will remove methane and do the men the most good, besides not collecting as much dust as a stream of air close to the conveyor.

Four wide rooms are shown on one side of a cross entry in Fig. 2. The latter may be made up of three or two headings. The former is more desirable, but in Fig. 2 two are shown with four rooms working and another started to direct the main air around the loading points on the belt conveyor. For this purpose, there should be checks in the belt-conveyor heading inby and outby the four loading points. Thus, the main air travel is through the line of crosscuts which would correspond to a third heading, and blowers may be placed in the room necks. The air velocity in the belt heading will be low and not so much dust will be picked up. Blowers *B-1* and *B-2* take some air from this heading, but this will not greatly increase the velocity along the belt. Crosscuts are shown in the rooms, as

required in all states unless the State inspectors approve their omission. The slight extra expense probably is justified by better ventilation, easier communication between rooms, etc.

The first room is shown short and each succeeding room longer. This improves the air, reduces the length of conveyor required, makes power consumption more uniform and has other advantages. It may reduce the output somewhat near the end of a section unless end operations are planned carefully in advance. A blower is not required in starting a wide room or for making a few cuts near a room crosscut. Consequently blowers and tubing may be moved, but it is well nevertheless to provide four units.

Line brattices and checks may be used to direct air around the faces, but, as explained in connection with the arrangement illustrated in Fig. 1, it is possible to get better results with blowers and tubing. Line brattices, as frequently used, direct the air through narrow passages, thus materially increasing the pressure against the main fan. Auxiliary blowers require power but they also tend to relieve the outside fan of some of its work. The discharge end of the belt may be arranged as in Fig. 1. Working rooms to the rise on one side of an entry reduces the number of wet places, simplifies drainage and provides better entry protection under most conditions.

PRODUCTION "INSURED"

By Preventive Electrical Maintenance

Mechanization Expansion Emphasizes Need for Maintenance Training and Inspection — Regular Attention Reveals Threatened Trouble — Equipment Analysis Provides Data for Maintenance Schedule — Cleanliness Essential

By H. L. HUNTLEY
Central District Superviser, Maintenance Sales
Westinghouse Electric & Mfg. Co.
Pittsburgh, Pa.

MECHANIZATION in the coal industry has expanded to meet the increasing demands of rising production and the necessity of getting coal on the job faster than ever before. Under existing full-peak production, it is vital that the electrical equipment be kept in proper condition to provide wartime capacity tonnages.

More perhaps than any other industry, coal mining has one of its toughest problems in the maintenance of electrical equipment.

Preventive maintenance is based on the theory that it is better to keep out of trouble than to get out of trouble. Good maintenance simply means keeping equipment in satisfactory operating condition at all times.

Maintenance of electrical apparatus is principally the maintenance of insulation. Bearings, commutators, collectors, brushes and contacts require periodic attention. Regulators, instruments and circuit breakers that require setting and adjustments usually can be continued in operation, at least until a convenient shut-down period can be arranged. When motor insulation fails, however, it is considered extremely fortunate if only a temporary shut-down results.

Good Maintenance Program Trains and Upgrades Personnel—Consideration of personnel to handle this maintenance job underlines today's requirement of trained young men qualified to serve in various capacities in the mining industry in greater numbers than ever before. Where are such men to be found? The only answer seems to be for the industry to train them. Other industries have been doing this for years, with success. Various ones have established apprenticeship courses, wherein men receive the necessary fundamental training to fit them for positions in supporting industries. Trade schools have been a benefit; night schools and correspondence courses also have assisted in further training of men. Various textbooks on subjects and equipment important to the mining industry have been very worth while.

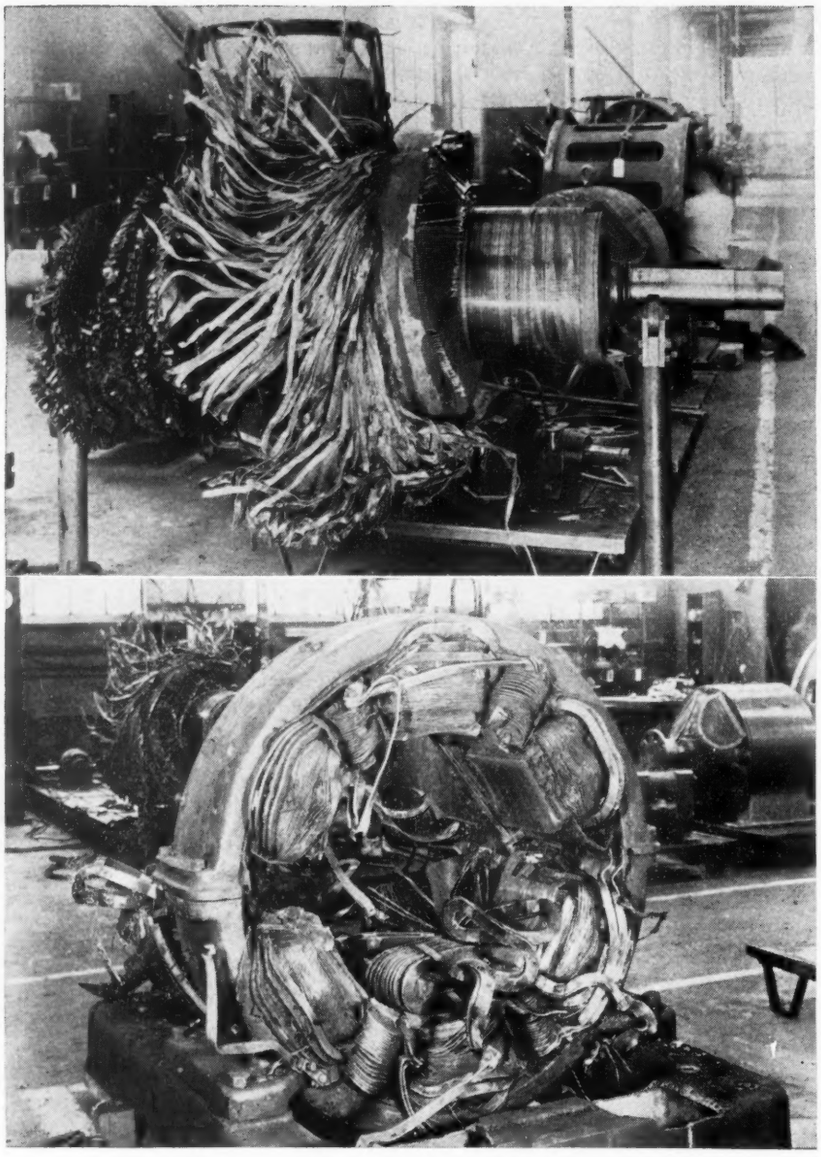
Another valuable training aid for maintenance men is obtained through electrical maintenance organizations located in various cities. Sessions by these groups always provide for a discussion period in which all benefit.

Most mine maintenance organizations have good men, but they need encouragement and should have every advantage in learning more about their work: the job for which they are held responsible. There should be a continuous upgrading of existing personnel, as a high turnover of maintenance men is not desirable.

To further assist in training maintenance men, various manufacturers will cooperate by furnishing copies of instruction books applying to equipment installed. They should be available at all times for reference and study by all responsible for the equipment.

Inspection Catches Threatened Trouble—Following the setting up of an adequate maintenance organization and proper and sufficient training of men on the equipment they are caring for comes establishment of a regular, consistent schedule of inspection. While some of the personnel will be engaged daily in construction, installation and overhaul jobs, it is important that sufficient men be continually on inspection work. Equipment lasts longer if inspected frequently and necessary repairs made promptly.

Correct maintenance should stress cleanliness of apparatus and inspection to eliminate threatened trouble and shutdown from wear, abuse and accidents from unnecessary risks. Naturally, a general pattern cannot be set down for all the various sized mines in the industry; but proper inspection schedules can be adopted to suit the needs of any particular sized operation.



Wrecked armature and field frame of 500-kw. generator.

Had overspeed relays and reverse-current relays been properly "inspected" and "tested" periodically, the damage from "motoring" and overspeed would not have occurred.

Analysis of all the electrical equipment will provide information for the scheduling of proper inspection. Of course, the duty cycle of equipment must be taken into consideration when planning the schedule.

To keep an accurate record of installed apparatus, it is desirable to have necessary nameplate data and renewal part ordering information. In addition to these data and information on location and transfer, a history may be kept of repairs and their costs. This scheme provides a fingertip index for immediate reference.

To record maintenance of equipment, a simple, convenient two-way chart may be used. Equipment may be listed vertically and inspection dates—by day, week or month—listed horizontally. This procedure provides a systematic schedule not only for inspection but also for planning overhaul and repairs.

Low Voltage—Adequate inspection should include locating power losses. Operating at overload or underload wastes power and money. An overloaded motor runs hot, with resultant deterioration of insulation, thinning of oil and shortening of bearing life. An underloaded motor runs at low efficiency. Losses should be determined by an instrument check. Important also is keeping proper voltage at the motor terminals under load conditions. Spot checking does not always reveal low-voltage conditions and a graphic recording instrument in use for at least a day or two often will show low-voltage conditions that should be corrected.

Low power factor is expensive because of penalty clauses in the purchased-power rate structure. However, low power factor can be corrected. By changing motors where possible to fit loads, by placing a synchronous motor on the line, or by use of capacitors, power-factor correction may be obtained and penalty rates avoided.

Insulation—Inspectors should insist not only that electrical apparatus be kept as clean as possible but by all means dry. Otherwise, failures will develop and efficiency will drop. There are many ways to clean insulation, depending on conditions. The manufacturer of your equipment can give you many recommendations on this subject.

Resistance Best Guide

The most practical way to guard against winding failures is still by measurement of insulation resistance at regular intervals, using either a "Megger" or an ohmeter. This provides information for a record of insulation resistance values over a period of time. A drop in insulation resistance from a safe value should call for immediate investigation to determine the cause before damage results. It is the general practice of insurance companies to demand an insulation resistance of 1 megohm per 1000-volts operating voltage, with a minimum of 1 megohm for apparatus that is to be insured. The insulation resistance of a machine is important and should be followed closely.

Temperature—In addition to the resistance values of insulation, it is important also to know the operating temperature of equipment. Temperatures are easily checked to determine if they are within safe limits. The cause of gradually rising temperatures during a short period of time should be investigated and abnormal conditions corrected. A sudden high rise in equipment temperature generally warrants a shut-down for thorough examination and test of the apparatus. When causes of breakdown are detected, through systematic checking of insulation resistance and operating temperature, production outage is reduced to a minimum.

Bearing Lubrication — Periodic checks of bearings on all rotating equipment, including air-gap measurement where possible, is an important part of inspection. The frequency of inspection, including addition of oil or oil changes, is best determined by a study of the apparatus' operating conditions. Older types of sleeve bearings

require more frequent inspection and checking for wear.

The most important point in bearing maintenance, whether sleeve or ball bearing, is cleanliness. This applies also to storage and handling of the lubricant. Although proper lubrication for all bearings at regular intervals is a necessity extreme care must be exercised to guard against excess oil or grease. Overlubrication results in damage to oil and grease seals, with consequent injury to insulation and windings. Lubricant seals should be renewed before windings become oil-soaked. Periodic cleaning of bearing housings also will help in reducing bearing failures.

Protective Devices—In the fields of both manual and automatic control for electrical apparatus, it too often is assumed that not much maintenance attention is required. On the contrary, control calls for many devices, some of which require periodic inspection. This is especially true of protective devices such as relays (overload, overspeed, reverse current, phase failure), bearing thermostats and circuit breakers. Particular inspection attention should be given to determining proper settings for the relays and, when possible, actual tests of the devices should be made to prove their protective value. Periodic tests and recalibration of indicating instruments, such as used on generator substation switchboards, are important to determine if the equipment is carrying the proper loads.

Safety and Maintenance

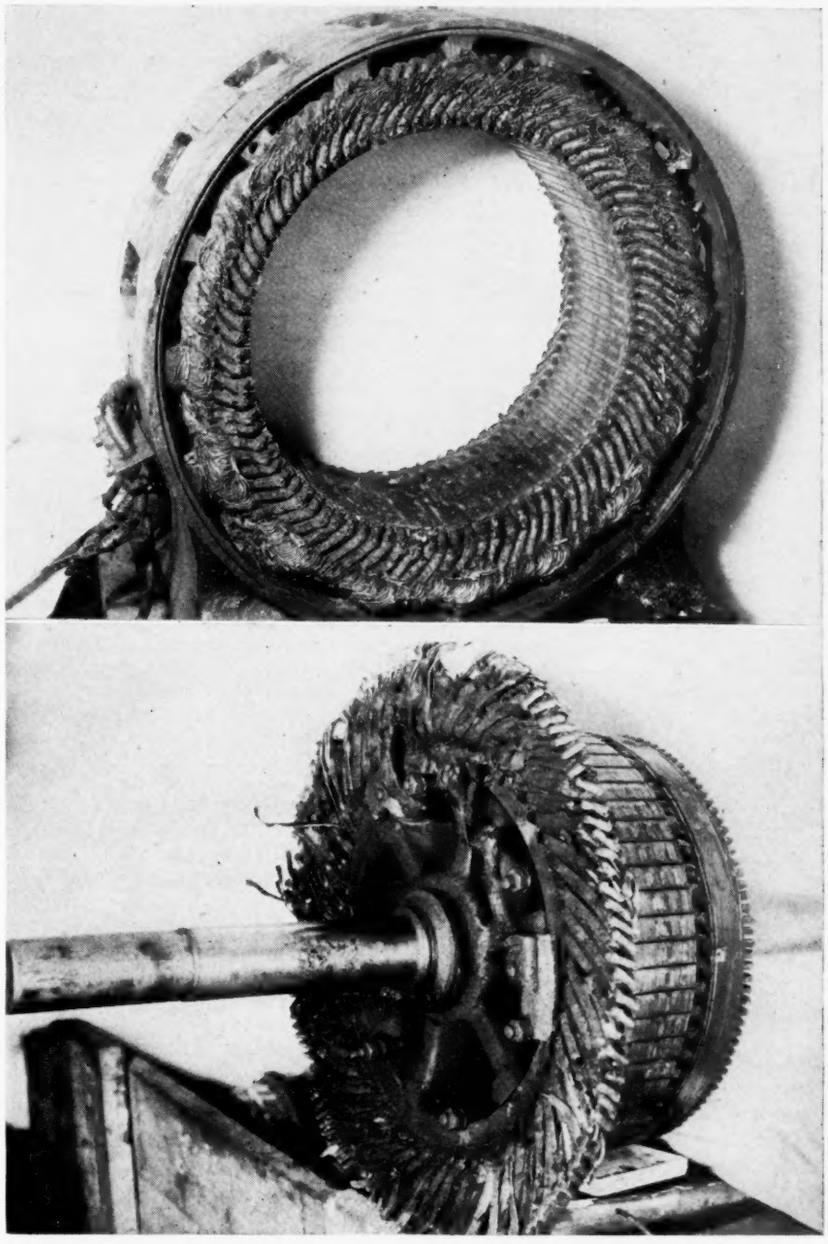
Safety—Proper maintenance inspection is important also as a means of combating an increasing proportion of industrial fires of electrical origin. No one will question the statement that electricity in its various uses is a potential fire hazard. Safety rules and regulations in the use of power, regardless of voltage, should be respected and absolutely followed. "Taking a chance" in the handling and distribution of electricity results only in disaster.

To safeguard operations, it is important to review stocks of apparatus renewal parts. The activity of each item should be determined to be certain that minimum stocks now in the storeroom will be sufficient. Under present-day conditions it is important to allow manufacturers a liberal margin of time to supply renewal part requirements, especially on older types of equipment in service.

Renewal parts for equipment should be obtained from the original manufacturer, giving complete nameplate data and name of part required. When possible, use the style number assigned to the part to expedite delivery. Maintenance files should contain renewal-part catalogs for proper identification. These may be obtained from the manufacturer.

Maintenance men can enlist the help and cooperation of operators of various classes of equipment in reducing maintenance costs. Machine operators require instructions for proper handling and use of apparatus. Neglect, and particularly abuse, can in most cases be entirely eliminated. Proper suggestions to the operators will help the maintenance organization in keeping equipment in good operating condition.

Proper and adequate maintenance of equipment is a dual responsibility of both management and maintenance men. The recognition which the maintenance department receives depends very largely on performance—the ability to keep the equipment producing.



What neglect did to a 75-hp. a.c. wound-rotor motor used in hoist service.

This motor was in use for over four years. No one had realized that over a period of time the insulation under the rotor steel bands had dried out, resulting in a loose band. Had maintenance inspection been made of the bands to check tightness, it would have been discovered that it was time to reband the rotor. The result was due to the front end band slipping toward the rotor iron, allowing the coils to fan out as shown at top. Naturally the stator winding was destroyed, as indicated at bottom (the collector was removed from the shaft so view of damage would not be obscured).

THE FOREMEN'S FORUM

Disaster Barricade That Uses Compartments To Keep Afterdamp From Trapped Men

Only Changes of Air Pressure Enable Bad Air to Enter Barricades—It Can't Be Entirely Excluded but Mr. Scollon Would So Mix It With Good Air That Only a Little Afterdamp Would Reach the Hideout

By J. ALFRED SCOLLON
Engineer, Peale, Peacock & Kerr, Cherry Tree, Pa.

MANY mine workers who, following a mine explosion or during a mine fire, build barricades and take refuge behind them die of carbon-monoxide poisoning either before rescue crews can reach them or shortly thereafter. Means of preventing these uncalled-for fatalities have been recently much studied and discussed. Operators have expressed a desire to equip their mines in a manner that will prevent such loss of life, but the increase in atmospheric pressure accompanying a rising barometer is responsible for almost all fatalities behind barricades and has not been given enough consideration.

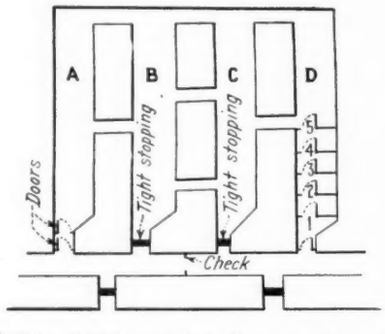
When firebosses' reports are studied and compared with records of barometric pressure, it is found that these officials have to fence off more places for gas when the barometric pressure is low than when it is high. It will be found also that a mechanical detector generally will show higher methane content when the barometer is low. As methane ignitions usually are the source of explosions and mine fires, such disasters are most likely to occur when the barometer reading is low or the mercury is falling. Should a mine explosion or mine fire, however, originate when the barometer is high, a fall of pressure always can be expected, and this will allow some of the air to leave the safety chamber in which the men have barricaded themselves. Thereafter, an increase of pressure may be anticipated, and this will cause air from the heading to enter through the barricade.

3½ Percent Polluted Air

For the purpose of this study, an aggregate rise of 1 in. in the barometer is assumed between the time at which the men take refuge in the barricade and the time when the rescue men and the air current of the reconstructed ventilating system reach them. With this aggregate increase in pressure, the atmosphere will have contracted about 3½ percent and something else—probably polluted air—will have entered through the stoppings and barricades to replenish the partial vacuum.

No place in the mines is ever so tightly sealed that the atmosphere from the heading can be prevented from passing through the barricade, because, with 1 in. of difference of barometric pressure, about 71 lb. per square foot will be imposed on all stoppings. To compensate for the reduction in volume without contaminating the atmosphere behind the barricade, the suggestion has been made that tanks of compressed air or oxygen be kept in the safety chamber, the valves of which the men taking refuge behind the barricade can open in the desired measure and thus provide for their own safety.

Unfortunately, they will not know just when it will be necessary to release that air, and to be safe they will have to release it at such a rate that the quantity will be at least equal to the maximum rate at which the air in the safety chamber is likely to be reduced in volume, and this flow will have to be continued at that rate until the men have been rescued, for even if they could regulate the flow to accord with the barometric pressure in the safety chamber as registered by an aneroid barometer, they would still not be able to provide the proper atmospheric conditions, because it is not the atmospheric pressure in the chamber that matters but the difference in pressure between heading and chamber. The quantity of compressed air or oxygen required to keep a continuous out-current from the chamber would be so high probably as to be impracticable.



Safety chamber with leaky compartments which dilute the afterdamp as it enters.

Heat from a storage battery placed in the chamber might furnish the necessary expansion to counteract the increased pressure of the atmosphere and thus keep out the invading afterdamp; in fact, a rise of temperature of only 17 deg. would correct an increase of pressure of 1 in. of barometer. At first thought it seems quite a desirable way of obtaining the desired result, but the pressure may not rise, and then, if the temperature is raised, air will leave the chamber and more heat will have to be applied to assure protection against a pressure increase, real or anticipated, and no one will know just what increase in pressure at any time needs to be corrected. Moreover, the battery may run down and its periodical charging may be overlooked.

A better plan would be to allow the afterdamp to enter compartments provided at the entrance to the barricaded area, as shown in the accompanying sketch, and there become diluted to such a degree that, when it enters the part of the barricaded area in which the men have taken refuge, it will not harm them, and yet this will be so done that, while it is effective, enough air will enter that the pressures will be equal on both sides of the barricade.

Use Rooms as Safety Chamber

The accompanying sketch shows a small group of rooms free of mine refuse that can be used on occasion for a safety chamber. Normally, they are ventilated by the regular air current. All openings to the mine atmosphere except those used in normal ventilation are tightly sealed. Doors are placed on the mouth of Room A, which are to be closed and tightly sealed when the safety chamber is to be used as such. At the entrance to Room *D* is a group of compartments for the dilution and partial detention of the afterdamp. Five compartments are shown in this sketch, but with other conditions some other number and other proportions may be found to give higher efficiency or greater economy.

Each of the Compartments *1*, *2*, *3*, *4* and *5* may have a volumetric capacity of one-thirtieth of the whole uncompart-

mented part of the safety chamber delimited by the barricades. A door leads from the heading to Compartment No. 1, another door from each compartment to its neighbor and finally a door from the last compartment to the remainder of Room *D*. These doors, or the partitions upon which they are hung, might be so built that the openings in them would suffice to pass enough air through the compartments to the safety chamber to assure that, as the atmosphere contracts, no effective pressure would be thrown on the doors in Room *A* or against the stoppings in Rooms *B* and *C*.

As carbon monoxide is normally light, and would be more so if it should happen to come from a fire zone, it tends to rise to the roof with the methane, and, as carbon dioxide is heavy, it will fall to the floor, hence it might be well to make the doors tight and provide boreholes at the mid-heights of the partitions between compartments, so that if the gases should stratify, the carbon monoxide and carbon dioxide alike will find greater difficulty in passing through. By placing these boreholes at alternate ends of the partitions, the afterdamp from the heading will be compelled to travel from end to end of each compartment and thus mix more thoroughly with the air in that space.

When several boreholes are drilled in a partition, these holes must be at exactly the same elevation, or, if slotted openings are to be used, these must be made horizontal and at the same elevation in each partition; otherwise differences in specific gravity at different elevations are likely to cause a certain degree of circulation and mixing of the atmospheres in adjacent compartments regardless of any change in atmospheric pressure.

From this point on let the mine atmosphere outside these rooms be regarded as "afterdamp" and the atmosphere within as normal air. The word "afterdamp" will be used to designate the atmosphere in the heading and not pure carbon monoxide, which gas may constitute perhaps only 3 percent of the entire mixture. The men have entered and all openings to the heading have been closed and sealed except those on the compartment at the entrance to Room *D*, where small openings must be maintained, so that any air going into the safety chamber must find its way through them.

Taking Part of a Part

As the atmosphere begins to contract, the afterdamp will begin to flow into Compartment No. 1, where it will be diluted with the normal air in that compartment. The afterdamp thus diluted then begins to work its way into Compartment No. 2. When the atmospheric mixture starts to flow from No. 1 to No. 2, the quantity of afterdamp in that second compartment would be zero but it gradually would become an afterdamp mixture, weak at first but gradually getting stronger with the continued flow of afterdamp into Compartment No. 1. The flow would thus continue from each compartment into its neighbor, but in each case a much weaker mixture than before would be traveling and only a harmless quantity of afterdamp would pass out of the inner compartment, the remainder being detained in the several compartments.

Calculations have been made to determine the approximate quantity of afterdamp that during a 1-in. rise in barometer will leave the heading adjacent to the barricade and enter the safety chamber, and it has been found that, by using five compartments as shown, when the mercury changes from 29 to 30 in., the quantity of afterdamp will be less than 0.05 percent. Assuming the carbon-monoxide content of the afterdamp as 3 percent, the quantity of carbon monoxide in the safety chamber would be 0.0015 percent, which may be considered a mixture that can be breathed with safety.

Diffusion at the small openings in the partitions would in some degree tend to increase the quantity of the afterdamp in the atmosphere of the barricaded area when the barometer is at a standstill or changing, but it is believed that diffusion would not make any appreciable change in the result.

In making these calculations it was found that with a 1-in. rise in barometer, about one-third as much afterdamp would enter Compartment No. 4 as would enter Compartment No. 3 and that about one-third as much would enter Compartment No. 5 as would enter Compartment No. 4. This would suggest what might be expected to result from a further increase in the number of compartments.

Precautions for Rescuers

In rescuing men from such a barricaded area, care would have to be taken to see that the air current would not flow through this area from Room *D* toward Room *A*. This would happen if the pressure at the entrance of Room *D* was slightly higher than the pressure of Room *A* and the entrance to Room *D* not tightly sealed before breaking the seal on Room *A*.

If the men are to be rescued through the entrance to Room *A*, then Room *D* must be sealed at the heading before the seal is broken on Room *A*, unless it is certain (1) that the ventilating pressure is higher at the entrance to Room *A* than at the entrance to Room *D*, and (2) that a check has been placed on the heading between these two entrances. If the rescue is to be made through the entrance to Room *D*, it will be necessary first to remove all afterdamp from the detention compartments.

No attempt has been made to describe completely what a fully equipped barricade should contain. The purpose is solely to show how the enormous quantity of afterdamp forced into a safety chamber when only a single barrier is provided may be reduced by the erection of multiple barriers which dilute the afterdamp, hold back some of the diluted mixture and allow a small quantity of it to pass on to be rediluted and resplit again and again until it reaches the men in a harmless percentage. The need for emergency supplies to be kept behind the barricade, such as compressed oxygen, water, canned food, blankets and first-aid supplies, has been carefully studied and extensively discussed by others, and does not require consideration here.

It will be noted that the afterdamp of the safety chamber after the barometric pressure has risen 1 in. is only 0.05, which would not be menacing even if the heading afterdamp were pure carbon monoxide and not a mixture in which that gas may not exceed 3 percent. "Concentrations of carbon monoxide up to 0.04 percent by volume when breathed for a period of one hour produce virtually no symptoms," according to I.C.6983 U. S. Bureau of Mines.

This arrangement of multiple dilution, in which a dilution is rediluted and that dilution is diluted again with a little revision might be helpful in the fighting of mine fires, air, in this case, being regarded as the contaminant of inert gas in place of carbon monoxide, which, in regard to a barricade, is viewed as the contaminant of pure air.

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Mines Usually Have Two Roofs, An Upper and a Lower

Many names have been given to the material adjacent to and above the coal. At first the only term for that part of the roof just over the coal bed was "drawslate," but this name commonly was restricted to the material that fell prematurely or tended to come down quickly. If it came down almost immediately when the coal was removed, it was termed the "following stone." But after a while more rock comes down, and the fall is not always a shale or slate; thus there is a disposition to give this another name than drawslate; so some have called it and the drawrock also the "immediate roof."

Perhaps the "lower roof" would be a good name. "Ceiling" would give a wrong impression of extreme thinness though it well designates material that does not supply strength and will fall even where the roof proper is intact, which is what is meant. The lower roof fails because it is not a part of the upper roof and therefore does not have the strength to resist bending that is the property only of deep beams. It is against this lower roof that prop and crossbar protection is needed. The objection to the use of the expression "upper roof" is that it is by many not regarded as a unit mass, as it usually is, but as a series of masses acting independently, but the lower or immediate roof is still more generally a group of incompletely integrated masses.

Care in selection of names is important, for fundamental differences separate upper and lower roofs. The upper roof usually is a continuous beam or plate resting freely on coal ribs and bending without exterior constraint. It may be broken all around by collapse of nearby workings so that it is a completely "free beam" or "free plate" held down only by its own weight. The lower roof, on the other hand, is pinched over pillars by the upper roof and is therefore not at all "free" but is what stress experts term a "fixed" beam or plate.

STATE-BOARD QUESTIONS

Questions Anthracite Inspector Candidates Were Asked, Sept. 2, 1942*

Horsepower to Move Air

Q.—If it takes 5 hp. to move a body of air at a velocity of 10 ft. per second, what horsepower will be needed to move the air in the same airway at a velocity of 900 ft. per minute?

A.—10 ft. per second=600 ft. per minute. Present velocity being 600 ft. per minute and desired velocity being 900 ft., the ratio between them is 1.5. Pressure needed to increase the speed 1.5 times will be 1.5 x 1.5 times as great, but, as the quantity of air that must be given that pressure to get that velocity will be 1.5 times as great, the power required also will be 1.5 times as great or proportional to 1.5 x 1.5 x 1.5 times the first velocity, or the third power of 1.5; that is, 3.375. Multiplying by 5, which is the horsepower at the lower speed, the final power needed will be 5 x 3.375=16.875 hp.

Specific Gravity of Mixture

Q.—A sample of mine air contains 7 percent CH_4, 5 percent CO_2 and 88 percent air. Will the mixture be lighter or heavier than air? What is its specific gravity?

A.—The sum of the products of the several gas percentages with their several specific gravities divided by 100 will give the specific gravity of the mixture. That is:

Gas	Percentage		Specific Gravity		Products
CH_4 (Methane)	7	x	0.5590	=	3.9130
CO_2 (Carbon dioxide)	5	x	1.5291	=	7.6455
Air	88	x	1.0000	=	88.0000
Mixture	100	x	X	=	99.5585

where X is the required specific gravity. Dividing the sum of the products on the right by 100, the specific gravity of the mixture is 0.995585, showing that the gas is lighter than pure air, which has a specific gravity=1.

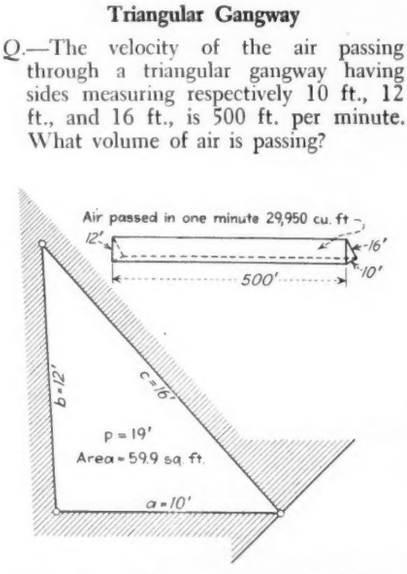
Air Pressure and Depth

Q.—The pressure at the top of a shaft is equal to that of 29.8 in. of mercury and that at the bottom equals that of 30.3 in.; what is the depth of the shaft if both top and bottom of the shaft are at the same temperature?

A.—The weight of a cubic foot of pure air at 32 deg. F. and a pressure of 29.92 in. of mercury (mean atmospheric pressure at sea level) is 0.08071 lb. The average pressure on the air in the shaft will be (30.3+29.8)÷2=30.05 in. Accordingly, as the weight of the air is proportional to the pressure, the average weight of a cubic foot of air will be (30.05÷29.92) 0.08071 =0.0810607. As there are 1,728 cu.in. in a cubic foot, the weight of a cubic foot of mercury=the weight of 1 cu.in. of mercury x 1,728, or 0.491 x 1,728=848.448 lb. Thus, the weight of mercury is 10,446.8 times that of air. The increase in pressure from top to bottom of shaft is 30.3—29.8=0.5 in. of mercury, or 0.5 x 10,466.8=5,233.4 in. of air column. Dividing by 12, to convert this figure to feet, the height of the equivalent air column will be 436.12 ft. Thus the shaft is about 436 ft. deep. This figure is based on still air of absolute purity. If the air has carbon dioxide, moisture, methane, an excess of nitrogen, dust or water in it, or if the air is traveling, the figure will be different. Indeed, it usually is either more or less than the calculated figure.

Triangular Gangway

Q.—The velocity of the air passing through a triangular gangway having sides measuring respectively 10 ft., 12 ft., and 16 ft., is 500 ft. per minute. What volume of air is passing?



Three-cornered passageway; insert on right is not to scale.

A.—Add the lengths of the three sides, a, b, and c together and divide by 2 to obtain the value of p in the equation:

$$\text{Area} = \sqrt{p\,(p-a)(p-b)(p-c)}$$

$$p = (a+b+c) \div 2$$

$$= (10+12+16) \div 2 = 19$$

$$\text{Area} = \sqrt{19(19-10)(19-12)(19-16)}$$

$$= \sqrt{19 \times 9 \times 7 \times 3}$$

$$= \sqrt{3{,}591} = 59.9 \text{ sq. ft.}$$

Pressure for Ventilation

Q.—If you have a gangway 8,500 ft. long and the cross-section of the gangway is 8x10 ft., what pressure is necessary in pounds per square foot to drive 50,000 cu.ft. of air per minute through the gangway if 0.00000001 is the coefficient of friction?

A.—$P = \frac{ksv^2}{a}$ where P is pressure, k is the friction per unit of surface for a speed of 1 ft. per minute (the coefficient of friction), v is the velocity in feet per minute and a is the cross-sectional area.

P (the pressure) is not known; k (the coefficient of friction) = 0.00000001; S (the rubbing surface) = (8 + 10) 2 x 8,500 = 306,000, a (the cross-sectional area) = 8 x 10 ft. = 80 sq.ft. and v (velocity) = quantity ÷ cross-sectional area = 50,000 ÷ 80 = 625 ft. per minute.

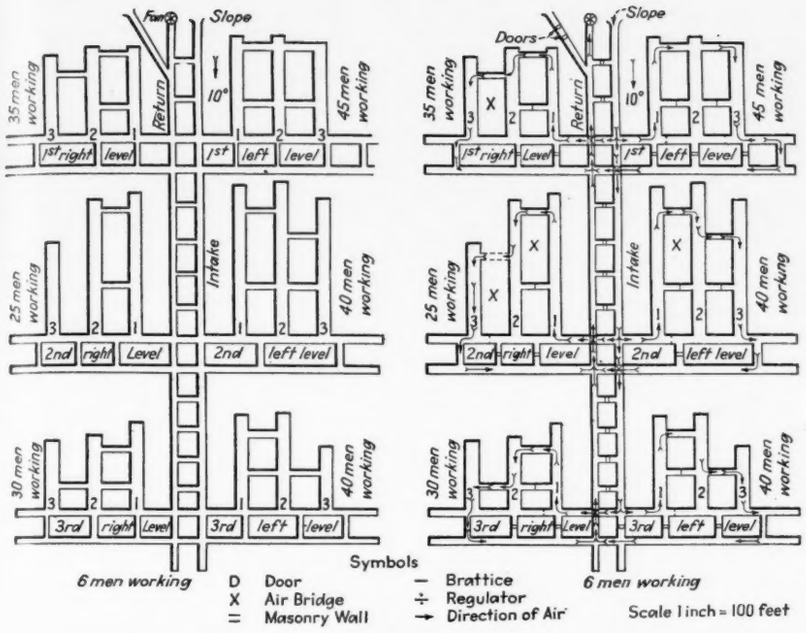
P = 0.00000001 x 306,000 x 390625 ÷ 80 = 14.94 +. Of course, this will carry the air only one way and not return it through a return aircourse.

Ventilating Mine Workings

Q.—(a) Assuming a mine layout as shown on accompanying sketch with the number of men working in each section as indicated, show (using the symbols provided in the sketch) how the air should be coursed to comply with the law; also (b) where and how the layout violates the mining law.

A.—(a) In no level are more than 75 men employed, so that all the workings can be ventilated on a single split of air and be in accord with Sec. 6, Art. X, of the mine law. On the left side of the sketch, embracing the workings started from the right-hand levels, the operations in two adjacent gangways, the first and the second or the second and the third, could be ventilated with a continuous current if they were on the left side of the mine adjacent to the intake. Being on

* Continued from December, 1942, *Coal Age*, p 70.



Figures show problem and solution respectively. Haulways in upper headings of levels.

the return side, it is almost impossible to do so with the present pillar widths and locations. In any event, more men will be employed probably at a later date in these gangway workings, so any continuous air current could be temporary only and not really worth while.

(b) The following violations are to be noted:

(1) At the surface, the slope is too near the traveling way. Instead of the two being 150 ft. apart, as required in Art. IV, Sec. 1, these two passageways are separated by only 100 ft. of strata. This must be rectified. The law is quite definite in this matter but permits the fan to be placed near the slope, though, if there is a mine fire, the carbon monoxide and hydrogen from the return may be pulled back into the slope, and all the time the methane and carbon dioxide generated into the mine similarly may be carried back. In this mine, the fan is only about 35 ft. from the slope mouth, which is a separation that in practice has been shown to be wholly inadequate.

(2) The slope is only 35 ft. clear of the traveling way underground whereas 60 ft. of separation is required under Art. IV, Sec. 1.

(3) None of the pillars between level gangways and counters are 60 ft. wide, but apparently the law does not specify that these gangways should be 60 or more feet apart, yet the pillars are subject to an overturning stress that renders them less adequate even than the slope pillars, which latter, however, are longer in service and are a trifle more essential to the safety of the men.

(4) Pillar 3 in the 1st Right Level, pillar 1 in the 2d Right Level, pillar 3 in the 3d Right Level, pillars 2 and 3 in the 3d Left Level, pillars 1 and 2 in the 2d Left Level and pillar 3 in the 1st Left Level are more than 60 ft. long, but apparently this is not forbidden in the law. Also the counter of the 2d Left Level has been driven more than 60 ft. ahead of the last crosscut. Here again the law does not appear to specify the sizes of these pillars, probably because, where the crosscuts are used as chutes for the breasts, they must be placed opposite such breasts and if made more frequently they would weaken the pillar unduly; in fact it has been found necessary in unusually deep mines to provide crosscut chutes only opposite every second breast.

(5) All the chamber pillars marked with a cross (X) have pillars in excess of 60 ft. in length in violation of Art. 10, Sec. 15. Room 3 in the 2d Right Level is 160 ft. long and has been driven without a crosscut. Some crosscuts needing to be driven are indicated by broken lines.

(6) Right and Left Levels are opposite, resulting in the return air from the right levels baffling those from the left levels. This arrangement also will weaken the roof both on the side headings and on the main intake and return, but here again there apparently is no legal remedy.

The mine has four serious violations of the law and a conscientious inspector would be disposed to close the operation down until some of the necessary changes have been made. However, by stopping during working hours the operations in Rooms 3 in both the first and second right levels and by driving crosscuts when the mine is idle, continued operation will be permissible in other parts of the mine. The faulty second opening might be corrected with the mine in operation, but work on its revision should be started immediately. The weakness of the slope pillar is almost irremediable until another slope is driven.

As regards the ill-ventilated rooms, the mine is, after all is said, near the outcrop and the occurrence of methane in the two rooms, if not already found, can be regarded as unlikely. However, in the future any foreman who would permit such violations should be laid off, for he could hardly be trusted to operate the mine safely after the inspector's back was turned, having permitted so many violations to exist, some of which are permanently menacing and others of which were hazardous at the time at which they were made but now are so no longer and may even be serving a good purpose.

Queries Posed Candidates for First Class Mine Foremen in Virginia*

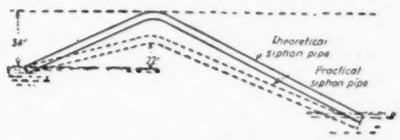
What is the weight of a cubic foot of water?

Seventy-five pounds .....( )
Sixty-two and five-tenths pounds (X)
Forty pounds .....( )
Twelve and six-tenths pounds..( )

To what practical height can water be lifted by a siphon at sea level?

Twenty-two feet .....(X)
Thirty-four feet.....( )
Sixty feet .....( )
Ten feet .....( )

[Theoretically speaking, with a barometer of 30 in., a siphon would just fail to work when a lift of 34 ft. has to be surmounted, because with a perfect vacuum above the water, with no back pressure of air or water vapor, the pressure of the air could hold the water only up to the 34-ft. level and not make it flow over. But, as there always is a back pressure of both air and water vapor and as air always is leaving the water to enter the "vacuum," the back pressure always is considerable, especially when the water travels slowly, giving the air a good opportunity to separate itself from the water and gather at the summit. Furthermore, pipe joints leak, so 20 or 22 ft. usually is all the lift that the siphon can afford in practice even where the discharge is under water and the air is completely expelled before the siphon is started by



Water in a pipe standing vertically 34 ft. presses as heavily as air, so water cannot get over the hump even if there is no pressure on the top of the water, but, with a 22-ft. rise, the balance is all in favor of the air pressure, so, if there is not much back pressure, the air will force the water over the hump fast enough to expel the water with any air the water may contain.

* Continued from January, 1943, *Coal Age*, p. 70.

several devices for clearing its legs of air, such as making the legs without air-retaining bends, rapping the legs well with a hammer to jar out air retained by the water and making the joints tight.]

An airway is 6 ft. high and 12 ft. wide; what is the cross-sectional area?
- 6 plus 6 plus 12 plus 12 = 36 ft. ( )
- 6 plus 6 × 12 = 144 sq.ft. ... ( )
- 12 plus 6 × 12 = 216 sq.ft. ... ( )
- 6 × 12 = 72 sq.ft. ... (X)

[The first answer gives the perimeter or periphery in feet, though periphery, to be exact, means the distance around a rounded body and not a rectangular one. The next two answers don't represent anything. Height × width gives cross-sectional area.]

What is meant by the area of an airway?
- Amount of rubbing surface ... ( )
- Number of square feet in a cross section ... (X)
- Product of length and width ... ( )
- Diameter squared times length ... ( )

What is effective ventilation?
- High velocities and plenty of oxygen ... ( )
- When powder smoke is kept off haulways ... ( )
- Sufficient quantity and quality of air continuously conducted to all working places ... (X)
- When all explosive gases are diluted below 0.5 percent ... ( )

[The third answer seems to cover the question best as it covers the fourth answer, which also is correct. Air at the face in sufficient quantity and quality is the important need. Visible powder smoke should be kept off haulways, but the real test is the condition of the air at the working face. High velocities are undesirable, as they raise coal dust, thus making a combustible atmosphere. It is better, if possible, to have large or many airways and relatively slow air speeds, but the speed must be high enough to prevent carbon dioxide and methane from separating and failing to accompany the air to and along the return; enough air, that is, to remove noxious gases, but not to lift coal dust.]

What effect do obstructions in airways have on the quantity of air circulated, the fan remaining constant?
- Quantity is decreased ... (X)
- Quantity is increased ... ( )
- Quantity will not be changed ... ( )
- Quantity will increase atmospheric pressure ... ( )

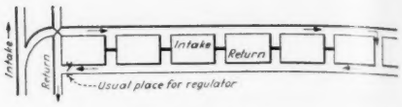
[At constant fan speed, the quantity of mine air will be reduced by a roof fall regardless of fan type or power applied. The reduction will be less marked if the slope of the pressure-volume characteristic of the fan is steep at the point of fan operation than if the slope is easy or flat. Original volume can be maintained only by increasing the pressure across the mine by an amount equal to the additional resistance presented by the obstruction.]

What is meant by splitting a ventilating current?
- Division of the air as made by the individual fan blades ... ( )
- Division of the main current into separate circuits ... (X)
- Stratification of air into layers of gases having different weights ( )
- Conducting the current to the face by stoppings, curtains, etc. ... ( )

[Splitting an air current is causing a current of air to divide, part traveling in one direction and part in another. A current may be split into a number of parallel airways but the meaning of splitting in the mining law is the dividing of the main current into separate circuits, thus supplying one group of areas and men with a separate air current from that provided for the men in other parts of the mine.]

Where are regulators usually placed in a mine?
- Usually on the haulway near the entrance to a section ... ( )
- Usually at the return ends of the splits which have the least resistance ... (X)
- Usually near the fan ... ( )
- Usually in the crosscut nearest the face ... ( )

[Opinion has differed as to the best location for a regulator, but the second position involves the least trouble, for it is a permanent position and, in most mines, being in the return, it is where the regulation will not interfere with haulage and where also it usually will not be interfered with by traveling men who may have their own ideas as to the quantity of air they should have in their particular split, instead of recognizing a community of interest. Moreover, the position is one that does not change. The "crosscut nearest the face" would be a location changed every few days, traversed by men who might meddle with the setting of the regulator and traveled by cars that would take up so much of the free space as would prevent any effective regulation. It is put in the split having the least resistance so that it will compel the air to travel in the splits having the greatest resistance. It is for the benefit of the latter that the regulator is devised.]



Regulator is put where there is no travel, so it is not in the way and no one is likely to meddle with it.

Examination for Coal-Mine Officials State of Colorado*

Cross-Sectional Areas

Q.—A haulageway is 10 ft. wide with vertical side walls 5 ft. high. The upper part above the walls is a half circle the diameter of which is 10 ft. What is the cross-sectional area of the haulageway? Formula: Area of circle=d^2 x 0.7854.

A.—The lower part of the haulageway below the circular arch measures 5x10 ft. =50 sq.ft. The diameter of the circle is the same as the width of the roadway, 10 ft., but only half the circle is present. So the area of the upper part =10^2 x 0.7854 ÷ 2 = 100 x 0.7854 ÷ 2 = 39.27 sq.ft., and the area of the entire haulway is 39.27 + 50 = 89.27 sq.ft.

Q.—An airway is 7½ ft. high and 10 ft. wide. A tool box 3½ ft. high and 3 ft. wide is standing in this airway. What is the cross-sectional area for the passage of the air current in the airway at the point where the box is standing?

A.—The airway measures 7½x10 ft. = 75 sq.ft., but from it must be deducted the cross-section of the tool box or 3½x3 = 10½ sq.ft., leaving 64½ sq.ft. for the free area of the airway.

Q.—A roadway is 6 ft. high and 13 ft. wide. It has a board line brattice throughout its length, which brattice is 3 ft. from one side. What is the velocity on each side of the brattice, if the quantity circulating is 9,000 cu.ft. per minute.

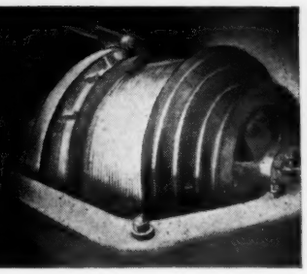
A.—Assuming that the brattice does not take up any room, but merely divides the two sides of the headway, which of course could not be true, as boards and props are space-filling items, the area on one side will be 3 ft. wide and on the other 13—3 ft. or 10 ft. wide. Both areas are 6 ft. high, so the two areas are 3x6 = 18 sq.ft. and 10x6 = 60 sq.ft. respectively. The speed on the narrow side is 9,000 ÷ 18 ft. per minute = 500 ft. per minute and on the wide side 9,000 ÷ 60 = 150 ft. per minute, assuming that there is no leakage.

Horsepower in the Air

Q.—The volume of air entering a mine is 96,500 cu.ft. per minute. The water-gage reading is 2.5 in. What is the horsepower in the air? Formula: Q x W.G. x 5.2 ÷ 33,000 = H.P.

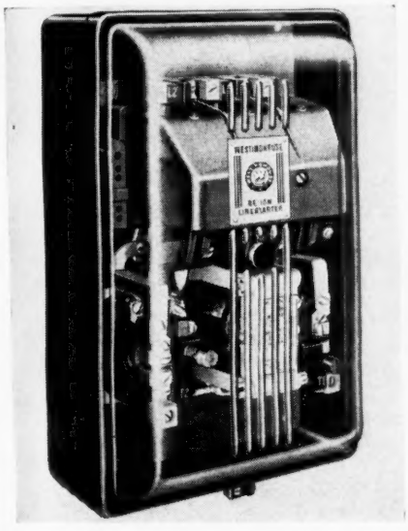
A.—The pressure in pounds always is 5.2 times the water gage in inches because an inch of water puts a pressure on a square foot of surface of 5.2 lb. The water gage being 2.5 in., the pressure is 5.2x2.5 =13 lb. per square foot. The quantity of air thus pressed is 96,500 cu.ft. per minute, so the energy=1,254,500 ft. lb. A horsepower has been arbitrarily fixed at 33,000 ft.-lb. per minute. So all that remains to be done is to divide by 33,000 to obtain the horsepower. 1,254,500÷ 33,000=just about 38 hp. Be sure that the velocity of the air is given in cubic feet per minute. If given in feet per second the formula would not give correct results.

TIPS FROM MANUFACTURERS



Linestarter

For machine tools, pumps, fans and similar machines, a new Size 2, Class 11-200 linestarter requiring less than half the mounting space of former units without sacrifice of wiring space is announced by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Designed for group mountings, built-in applications or remote mountings, this compact unit has a new clapper-type armature with knife-edge bearings. It utilizes double-break silver-to-silver contacts; overload relays are reset either by hand or automatically.



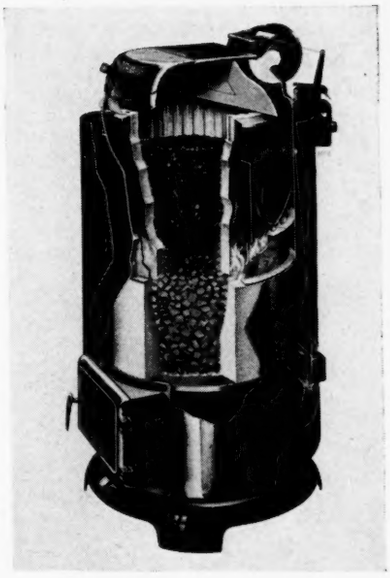
On applications requiring sequence or auxiliary interlocking, provision is made on this linestarter for a total of four normally open or normally closed electrical interlocks. All parts of the new unit are accessible from the front and all control circuit terminals and interlock terminals are clearly marked for easy installation and repair.

•

New Coal Heater Out

Distribution of a new circulating coal heater—the Conservator—is now being set up for retailers. The patents for the Conservator are held by the Conservator Products Co., a subsidiary of the Caloric Gas Stove Works, Philadelphia. High priorities, it is stated, have been granted for materials for the production of the new stove and to a group of manufacturers who will make Conservators on a license basis with the Conservator company waiving royalties for the duration.

The Conservator burns either anthracite or bituminous coal without a change of grate, the company states. It can be



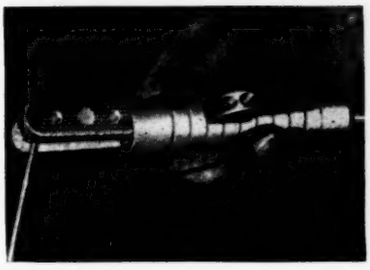
set up easily and connects to any flue or fireplace. The fuel magazine has a capacity of 135 lb. of coal. For normal operation, it is said, the Conservator requires refueling only once every 24 hours. In mild weather the heater will function for from three to five days without attention. The Conservator has been engineered for cleanliness, according to the company. All metal parts have an extra heavy porcelain finish, easy to keep bright and clean. Over-all width is 26 in.; over-all height, 48 in.; total effective grate area, 182 sq.in.

The Conservator is to be distributed through department stores, furniture stores, hardware dealers and appliance dealers.

•

Arc Welding Electrode Holder

A light, slender, easily handled arc welding electrode holder designed especially for welding operations around mines has been introduced by Jackson Products, Detroit, Mich. The holder—Model F-1—is made of special high-conductivity copper alloy, has a rated capacity of 200 amp., takes rods from the smallest



to $\frac{3}{16}$ in., has an over-all length of $7\frac{7}{8}$ in., weighs 12 oz. and has mechanical or solder cable connection. Insulated, it protects the welder's eyes against flash and eliminates work spoilage that ordinarily results when a bare-type holder comes in contact with the work. Its light weight and slim proportions enable the welder to manipulate it easily in tight places.

•

Glass-Fiber Cable Hanger

For use in mines, shipyards and on construction projects, a durable glass-fiber cable hanger has been developed by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. This cable strap is said to be impervious to moisture and will not rot, stretch or shrink. It is capable of supporting about 200 lb. The glass fibers are protected and the insulation value increased by a heat-resisting varnish treatment.

The standard size hanger is 14 in. long and $1\frac{1}{2}$ in. wide. The $\frac{1}{2}$-in. metal grommet in each end permits nailing to wooden pillars. Straps are used to support cable or can be wrapped around cable to prevent slippage.

•

Three-Wheel Truck, Grease Gun

Gibraltar Equipment & Mfg. Co., St. Louis, Mo., offers the "Gemco Tru-Blu" three-wheel truck built as a standard unit for tools, supplies and the haulage of many other items. It has spoke-type flat-rimmed all-steel wheels equipped with roller bearings. The front wheel is self-cleaning. Design of drawbar and fifth wheel permits the truck to be turned within a radius of less than the length of the truck body. Drawbar is strongly

built with ample handle surface to be operated easily by hand and also a coupling for pulling the unit with a shuttle bar, industrial tractor, storage-battery motor, etc.

Gibraltar also announces an improved grease gun that is said to be proving helpful and economical in field service. Pressure at the grease tip has been increased over conventional types and a special grease-resisting rubber hose is used which is practically indestructible.

•

Dust Respirator

To save metal for war production, the M.S.A. Comfo dust respirator has been redesigned with filter cases of black plastic, announces Mine Safety Appliances Co., Pittsburgh, Pa. The unit now offers better appearance plus less resistance to air flow, according to the manufacturer. The new filter container units are thinner, with rounded edges, permitting even better sidewise and downward vision.

The redesigned plastic filter cases have high impact strength with no electrical conductivity. They are not affected by perspiration. The field-proved plastic model has twin side-placed replaceable filters of unusually large area, easy to clean and maintain, and is available in types to meet various dust and mist conditions.

•

Metallizing Preparation

Metallizing Engineering Co., Inc., Long Island City, N. Y., announces the new fuse-bond process and equipment for its application, whereby machine components and similar metal parts now may be prepared for metallizing electrically. Main advantage claimed for the new process is that it affords an adequate bond on the hardest surfaces; also that it simplifies preparation of narrow edges, flat areas and cylindrical parts having keyways, and other interruptions in their surfaces.

Application of the process is with the Metco fuse-bond unit. Operating on any 110- or 220-volt unit single-phase power line, this equipment is said to fuse a rough deposit of electrode metal into the surface to be metallized. Electrodes are applied to the work with a special holder which uses up to six electrodes at a time, depending on the size and nature of the part to be prepared. Small parts may be prepared with this equipment as easily as large shafts, since there is no excessive heating of the base metal or disturbing of its physical characteristics. Contained in a cabinet measuring only 24 in. high, the fuse-bond unit weighs only 170 lb. All cables and attachments fit into a bin in the top of the cabinet. Mounted on casters, it can be wheeled to the job. Further information is contained in Bulletin 44, obtainable from the company.

•

Portable Pipe Bender

Tal's Prestal Bender, Inc., Milwaukee, Wis., offers a new portable hydraulic bending machine that is said to produce smooth, even bends on iron and steel bar and pipe in one single simple operation. Particularly in the present critical raw-material situation, the maker recommends it as a material-, time- and labor-saving device which can be set up at any place on construction or repair without bolting. No heating or filling is required, and smooth bends, without kinks, without wrinkles and with a minimum of distortion, are obtained.

•

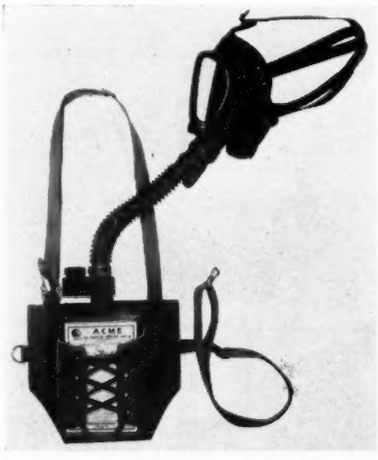
Gear and Wheel Pullers

Armstrong-Bray & Co., Chicago, announce the addition of two new Steelgrip rigid-arm gear and wheel pullers. The new units add to a line that will take care of a wide range of jobs, covering factory work, tank, tractor, truck and other machinery maintenance, etc. The forged steel arms, forcing screw, etc., are heat-treated for great strength. They are made in three sizes. Circulars will be furnished further describing this tool.

•

Gas Mask

Acme Protection Equipment Co., Inc., Pittsburgh, Pa., offers the improved Acme full-vision all-purpose gas mask, now carrying the U. S. Bureau of Mines permissible plate and said to combine protection against carbon monoxide and other gases with complete protection against smoke. According to the maker, the Acme mask gives full vision, including downward; has clear lenses, free from fogging or steaming, and has gas-tight fit without uncomfortable pressure. An automatic timer shows the wearer at a glance how much of the service life of his canister has been used up and how much remains.



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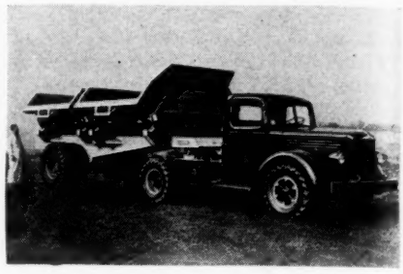
Semi-Trailer

Easton Car & Construction Co., Easton, Pa., offers the new TR-15D semi-trailer for use in moving earth, rock and ore. Instead of a body of 17 tons capacity it has been divided into two sections which are dumped independently. The half loads discharged are handled easily.



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Industrial Notes

Robins Conveying Belt Co., Passaic, N. J., has appointed John T. Hoyt as comptroller and R. C. Gray as works manager.

Peerless Pump Division, Food Machinery Corp., Los Angeles, Calif., has named Dan R. Rankin as acting chief engineer. Previously he was assistant to the chief engineer.

Caterpillar Tractor Co., Peoria, Ill., has named James H. Deaderick, assistant general parts manager since February, 1941, as vice president with administrative direction of the parts, service and traffic departments.

Atlas Powder Co., Wilmington, Del., has appointed Ralph K. Gottshall as director of sales of the explosives department, in full charge of the sales division. Heretofore manager of the company's Northwestern district, with offices in Seattle, Wash., he will now be stationed at the general offices in Wilmington. William T. Mahood, who has been connected with the contractors' department, succeeds Mr. Gottshall as manager in the Northwest.

Weir Kilby Corp. plant at Cincinnati, Ohio, has been awarded an Army-Navy "E" pennant.

Templeton, Kenly & Co., Chicago, announces that Charles A. Crane has rejoined the company as assistant to the president. He will devote part of his time to the development of new types of jacks as well as to the broader application of the company's present line to new industrial uses.

Cardox Corp., Chicago, has appointed Dr. P. W. Leppla as chief chemist of its research division. He will have headquarters in the company's general office, report-

LOOK OUT, you Axis aviators! This bomber is a hornet with a sting on every side . . . protected from attack by blistering fire poured to all points of the compass.

Protection is also important here at home. Guard your equipment and tools to save vital metals . . . cut down needless waste and we can produce more war materials. Storage batteries, for example, last longer when you follow these four simple rules. Obey them all now and you're hitting the Axis. *Buy to Last and Save to Win!*

Exide
IRONCLAD
BATTERIES

THE ELECTRIC STORAGE BATTERY CO., Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

PROTECT YOUR BATTERIES FROM THESE FOUR ANGLES:

1. Keep adding approved water at regular intervals. Most local water is safe. Ask us if yours is safe.
2. Keep the top of the battery and battery container clean and dry at all times. This will assure maximum protection of the inner parts.
3. Keep the battery fully charged—but avoid excessive over-charge. A storage battery will last longer when charged at its proper voltage.
4. Record water additions, voltage, and gravity readings. Don't trust your memory. Write down a complete record of your battery's life history. Compare readings.

If you wish more detailed information, or have a special battery maintenance problem, don't hesitate to write to Exide. We want you to get the long-life built into every Exide Battery. Ask for booklet Form 1982.

ing to Dr. Charles A. Getz, director of the research division. In this division Dr. Leppa will engage in development work in support of three other divisions: mining, gas and fire. For six years he was associated with the Continental Can Co., serving as assistant to the director of manufacturing research.

PROVIDENT LIFE AND ACCIDENT INSURANCE Co., Chattanooga, Tenn., has advanced Howard R. Hill to vice president.

WICKWIRE SPENCER STEEL Co., New York City, has appointed Wilfred C. Shattuck as wire sales manager. He will be located at the company's New York office.

FOOTE BROS. GEAR & MACHINE CORP., manufacturer of gears and speed reducers, Chicago, has appointed G. H. Quackenbush as assistant sales manager.

•

Trade Literature

AUTOMATIC CONTROLS AND INSTRUMENTS—Hotstream Heater Co., Cleveland, Ohio. Manual in five divisions is concerned with natural-draft coal burning, automatic stoker firing, chain-grate and spreader-stoker operation, forced-draft hand firing, and natural-draft oil burning. The use and value of combustion instruments is briefly analyzed.

BALL BEARINGS—Ahlberg Bearing Co., Chicago. Booklet explains the manufacturing procedure in renewing worn ball bearings, which, the company points out, it will be imperative to use for replacements, since there seems little hope in the near future that new ones will be obtainable for the purpose.

ELECTRICAL EQUIPMENT — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. "Wartime Conservation," a new booklet, contains recommendations by Westinghouse engineers for selecting, applying and using electrical equipment so as to achieve the best possible output with the greatest saving in critical materials. It covers uprating of motors, thermal temperature loading of transformers, industrial network systems, line equipment and materials; and gives tips on saving and salvaging materials. In addition to pointing out ways of saving vital materials in new equipment purchased, many examples are given of how existing equipment can be made to give better service and greater output by up-rating or rebuilding with more efficient materials than originally used.

LUBRICATION—R. G. LeTourneau, Inc., Peoria, Ill. Poster-size chart on power control units, Carryall scrapers, dozers, rooters, cranes, sheep's foot rollers, Tournatrailers and Tournapulls shows what points are to be lubricated at what intervals and recommends the proper lubricants and grease to be used for the most efficient operation.

METAL-CUTTING TOOLS — McKenna Metals Co., Latrobe, Pa. Vest-pocket manual gives complete information on the care, handling and most efficient methods of using Kennametal tools. Drawings illustrate tool applications, operations, tool styles and instructions for grinding, tool design and brazing blanks to be used as shanks to make tools in the operator's own shop. Tables are presented on grinding-wheel recommendations, suggested speeds of operation in relation to the hardness of the workpiece, proper chip breaker dimensions, and correct grade selection.

MINE LOCOMOTIVE MAINTENANCE—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. New "Time Saver" booklet, B-3150, is designed to aid in extending the life of mine locomotives. It covers operating tips; trouble checks; inspection reports; inspection charts, covering all principal parts of locomotives, and a lubrication chart for typical mine locomotives. A feature of the inspection charts section is a line drawing of each important part or assembly together with weekly and monthly inspection suggestions and a list of things to be done when a complete overhaul is undertaken.

POWER EQUIPMENT — Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin B-6186 completely describes power and distribution transformers and other electrical distribution equipment important in maintaining an efficient flow of power to vital war industries. Also discussed are important wartime considerations such as the use of modern welded construction and standardization of design, which saves vital materials in manufacturing and provides the advantages of interchangeability in installation. The new electro-cooler for increasing transformer capacity, and unit substations which simplify power control and distribution are new developments treated; others included are feeder voltage regulators, instrument and metering transformers, the oil-sealed inert gas system which protects transformer oil by isolating it from the outside air, and load-ratio control for load regulating voltage, power factor and phase angle.

PROTECTIVE COATING — Insul-Mastic Corp. of America, New York City. Booklet presents a study of the composition, properties and method of application of Insul-Mastic for the protection of metals, wood and masonry against rot, corrosion and decomposition by moisture, sun, heat and cold, acids and alkalis.

SAFETY EQUIPMENT — Boyer-Campbell Co., Detroit, Mich. Catalog 50 describes a complete line of equipment designed to guard against accidents, injuries, loss of time and loss of life to workers in a wide range of industries.

Keeping Lifting Jacks on the Job By Proper Maintenance

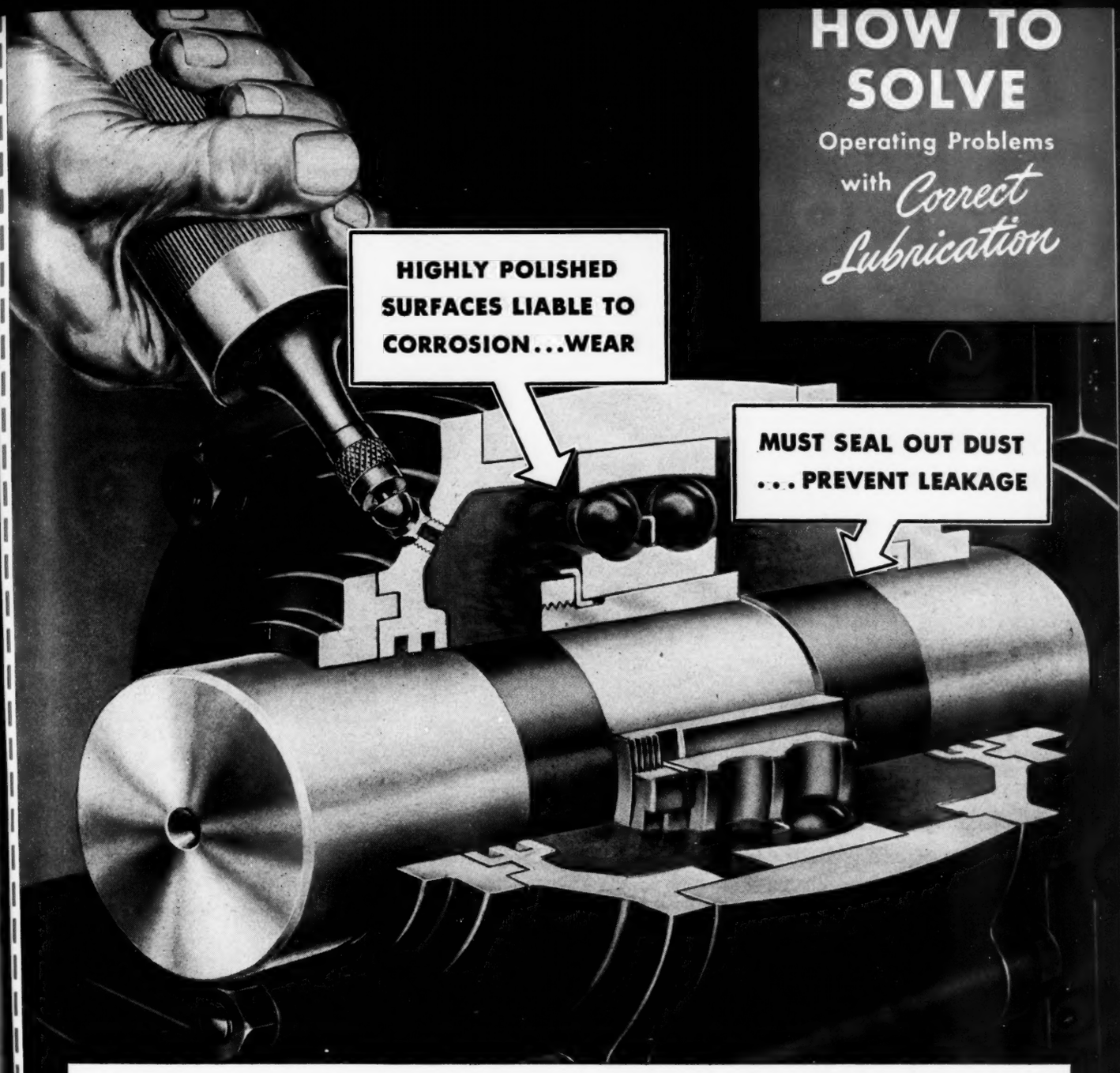
"IN PARAPHRASING the old nursery adage, 'All work and no play makes Jack a dull boy,' we hit upon the source of most jack failures—all work and no care," says F. J. Jakoubek, chief engineer, Templeton, Kenly & Co. "Today, any jack worthy of the name is a big tough bruiser. They look strong and they are strong, but they are not impervious to abuse, as some users might think. Probably few tools receive more rough handling and frictional wear, implying the need for lubrication, and yet we have had jacks returned for repairs after years of use that had never seen an oil can. A good grade of grease or oil, as indicated, should be applied to all bearing surfaces as needed. It should be borne in mind that proper lubrication reduces frictional losses and minimizes the effort required to operate the jacks under load.

"*Guard Against Overloading*—But there are even worse sins committed in the name of leverage. Overloading is one . . . . The weight of the load should be conservatively estimated and a sufficient number of jacks used to keep it within the rated capacity of each jack. Overloading imposes stresses that can spring racks and other parts, which result in eventual if not immediate failure. Such failures can be hazardous and are not the fault of the jack any more than driving a truck over a cliff is the fault of the brakes. Whether it is an automatic lowering jack (or so-called lever jack), a screw jack or a hydraulic jack, the same precautions against overloading should be taken.

"*Do Not Allow Jacks to Become Fouled*—Another bad practice is to allow the operating mechanism or rack bar of lever jacks to become fouled with dirt. Of course, this sometimes is unavoidable, particularly in the case of track jacks. Dirt should be blown out or, if necessary, the jack washed in kerosene. The operating mechanism on trip or track jacks is, of course, exposed and there is more chance for the entrance of debris. There is less danger with jacks of the non-tripping or automatic lowering type, which must be jacked down, as they have cover plates over the operating mechanism. In either case, however, keep socket pawl seat clean and keep rack teeth clean so pawls can engage fully (Fig. 1).

"In the case of the screw jack in its various forms, such as the regular bell-bottom screw jack, locomotive screw jack, the journal jack, standard speed jack, push-pull jack, shoring jack, machinist's jack, trench brace and mine-roof jack, care should be taken to keep the screws clean and well lubricated. Continued exposure to grit and dirt causes abrasion of the screw, wearing the threads so that play develops between it and the corresponding collar threads (Fig 2).

"A Rochester (Minn.) contractor, who uses a pair of screw jacks to take the load off the pneumatic tires on his portable rock-crushing plant, has ingeniously made skirts of washed cement bags, as shown, to keep out dirt (Fig. 3). Such a procedure is not always practical or even necessary, but screws should be cleaned off occasionally and particularly when they have been laid in clay or dirt. With hydraulic jacks, you have the similar problem to keeping the ram clean, as well as the extension screw that telescopes into the ram (Fig. 4).



Prevent Corrosion & Pitting

AFTER YOU'VE DECIDED to use Gargoyle BRB Greases for ball bearings you can go back to getting out production and be assured *that* problem is solved.

These greases do not break down and form the deposits which lead to corrosion and pitting.

In fact, their reliable stability allows bearings to go through periods of a year or more without repacking.

In addition, these greases do not change in structure within wide temperature ranges.

Here are greases you can *depend* on! This has been proved in thousands of applications under operating conditions.

You've solved an important operating problem when you let the Socony-Vacuum man who calls on you specify Gargoyle BRB Greases for the ball bearings in your plant.

GARGOYLE Lubricants

SOCONY-VACUUM OIL COMPANY, INC. — Standard Oil of N. Y. Div. • White Star Div. • Lubrite Div. • Chicago Div. White Eagle Div. • Wadhams Div. • Southeastern Div. (Baltimore) • Magnolia Petroleum Co. • General Petroleum Corp.

CALL IN SOCONY-VACUUM

"*Center Jack Under Load*—Another case where jacks are frequently mishandled is in placing them under the load. A jack's capacity, irrespective of type, is based on the load being placed squarely on the cap. To have the cap or the toe lift barely under the load places undue stress on rack bar, screw or ram, causing premature wear and sometimes damage to the jack. It is, furthermore, hazardous. Fig. 5-A shows wrong loading. A rotted beam might sustain a load with the jack squarely under it, but would splinter if the jack contacted only the edges.

"Another precaution to take is to have good seasoned timber blocking under your jack wherever possible, particularly when working out-of-doors. Blocking increases the area on which the load rests, protecting floors from splintering or cracking and protecting the jack against being pushed into the dirt. It further eliminates the possibility of the load being brought to bear against only part of the base.

"Particular attention should be paid to blocking or shimming where the load is not parallel to the floor or ground. Do not have load contacting only part of cap as in Fig. 5-B; shim up jack as in Fig. 5-D, so that cap and load have firm contact as in Fig. 5-C.

"To simplify the care and maintenance of common types of jacks, rules to observe governing each type, aside from those discussed previously, are given below:

Automatic Lowering Jacks

"1. Check overplay. When the pawl clicks into position, the socket stop should be at least ½ in. away from the housing on both the up and down strokes. If it has less than this, the clearance should be checked.

"2. Keep spring link clean. Dirt or caked grease interfere with the proper spring tension. Wash it in kerosene occasionally.

"3. Use correct size lever bar or pole. Wrong sizes can damage socket and are dangerous to use (Fig. 7).

"4. Don't mishandle jacks by using them for mawls or by throwing them off trucks or from other heights. Generally malleable, they may not break, but they get out of alignment.

Track or Trip Jacks

"1. Check overplay. When the pawl clicks into position the socket stop should be at least ½ in. away from the housing on both the up and down strokes. If it has less than this, the clear should be checked by inserting an 0.083 feeler in the space between rack tooth and pawl tooth with the socket in 'click' position. If an 0.083 feeler will not enter, the jack is not safe to use (Fig. 8).

"2. Check spring 'click' frequently. It is important because it is a signal that the pawl teeth are meshing properly with the rack teeth (Fig. 8).

"3. Keep lifting pawl seat clean. Blow out dirt or wash with kerosene occasionally. It helps teeth to mesh properly, providing a maximum bearing area, thereby reducing wear on teeth.

"4. Use proper poles or lever bars. Using the wrong size endangers the operator from slippage and additionally places needless stress on the lever socket (Fig. 7).

"5. Do not use jack as a mawl or car stopper. Do not throw it onto ties or rails. While jacks seldom actually break from rough treatment, they do get out of alignment from abusive handling, endangering operators.

Screw Jacks

"1. In lubricating the screw, machine oil is to be used in preference to grease (Fig. 2). Be sure bearing under cap is lubricated regularly, using grease (Fig. 9).

"2. Do not extend screw beyond the safe limit—roughly not more than two-thirds of the screw is to be run out (Fig. 2).

"3. Use good blocking under base and above cap, if necessary. Having a block under only half of the base can be disastrous.

"4. Clean screw and housing or base occasionally to remove grit and then relubricate.

Journal Jacks

"1. Do not operate or extend ram beyond indicator rings. Generally a safety stop is provided (Fig. 10).

"2. Operate the reversing plunger on the ratchet mechanism with the fingers. Do not strike it with a tool.

"3. Be sure proper blocking is used, particularly when jacking or pushing at an angle. Improper blocking prevents even distribution of weight, tending to throw internal parts out of line and causing sleeve to bind or scour.

"4. Keep the sleeve on the ram clean and free from nicks. When jack is used periodically, wash with kerosene once a year, blow out grit and repack ratchet mechanism and gears with grease (Fig. 10). Base can be readily removed. When jack is used regularly, do this three times a year.

Hydraulic Jacks

"1. Keep oil in reservoirs at correct level. Refill with proper grade of oil intended for the purpose (Fig. 4). Do not expect maximum lift if reservoir lacks oil.

"2. Keep the ram or sleeve as clean as possible and free of nicks and dents. A clean ram will not carry dirt down into the cylinder.

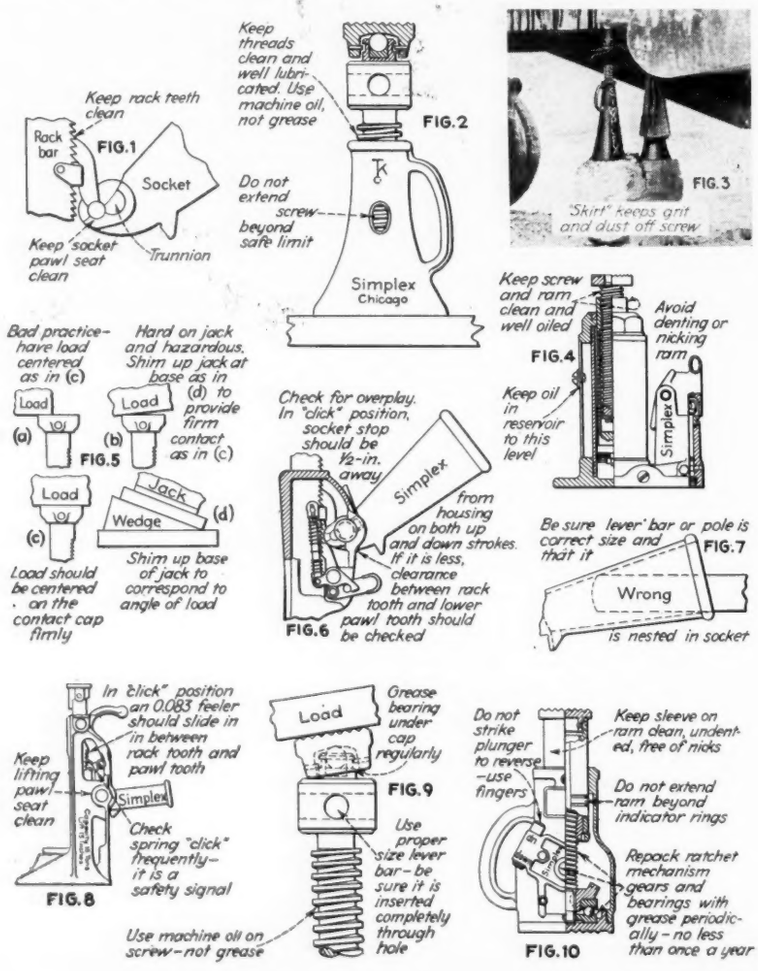
"3. Do not use a longer lever bar than the one supplied with the jack. A longer lever makes it possible to lift a heavier load than the jack was intended for, resulting in a damaged jack if not an accident.

"4. Pay particular attention to the blocking. Be sure it extends under the entire base, including the 'pump' to one side of the housing or cylinder.

"5. Be sure nuts at top and at base of housing are tight against leakage.

"6. On those hydraulic jacks where the release valve is not shielded, be sure it is not struck or damaged.

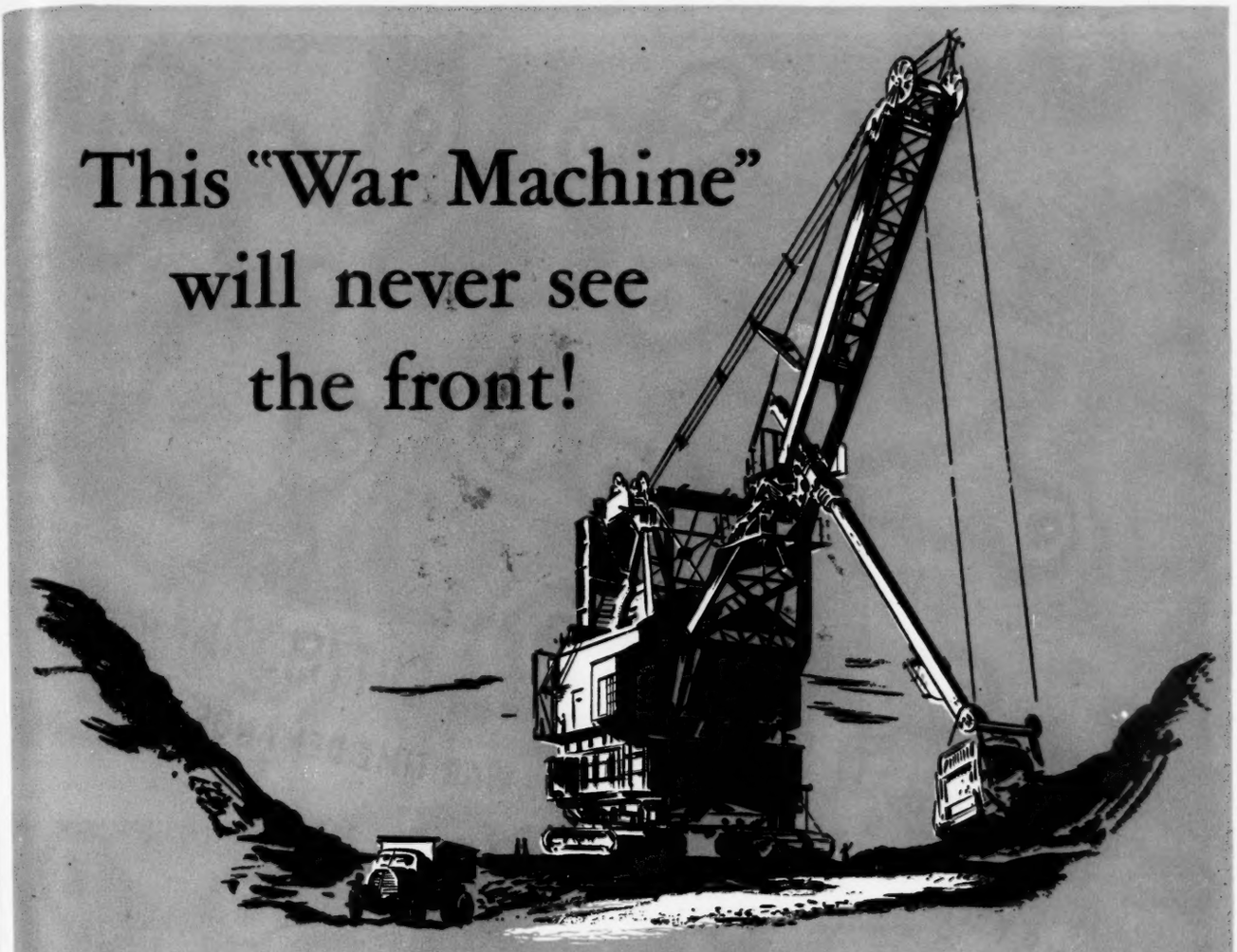
"7. Do not throw jack down or hammer it under a load. Never allow anything to strike the pump, as so doing can damage it beyond repair.



"Follow these rules and you will greatly increase the service life of your jacks and reduce maintenance as well. It takes time to do these things, but generally no longer than it takes to make repairs and it is certainly less expensive. We owe it to ourselves to make not only jacks but all tools and equipment last as long as possible in the interest of national economy. The metal that has been ordinarily wasted in the past, through abuse and poor maintenance, is now needed to save our very lives.

"The manufacturer of your jack is always glad to answer questions concerning particular maintenance problems or unusual applications and is genuinely interested in having you get maximum service and the longest possible service life. All he asks is that no one should expect the impossible from a jack such as using a jack of 5-ton capacity to lift a 20-ton load—it's unfair to yourself because of the waste of material in the jack plus the hazard—it's unfair to the manufacturer—yes, and it's even unfair to the jack!"

This "War Machine" will never see the front!



Giant shovels like this one are playing a vital role in our nation's coal production ... with the help of electricity and dependable wires and cables to carry it.

TO KEEP coal production steady, operators use large quantities of electrical power... delivered through modern research-built wires and cables like Anaconda's tough, rubber-saving Duracord* and it's all-rubber companion, Sunex Securityflex*.

Of particular interest today with the conservation of rubber all-important, is Duracord. This construction was developed during the last war to meet the need for super-strength cords and cables. Its "fire hose" jacket, woven from long fiber cotton, makes Duracord tough on the outside—the weak spot in most cables.

The Duracord jacket makes possible rubber savings as high as 50% without sacrificing any efficiency. For further information, please write us immediately. 42253

*Reg. U. S. Pat. Off.

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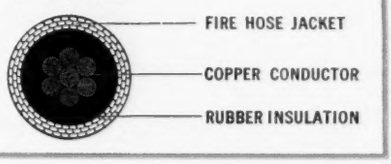
ATTENTION

Save Rubber with **DURACORD** *without Loss of Efficiency*

Here's a way you can effectively conserve rubber supplies and still get long-lived heavy duty electrical cords and cables . . . use Duracord.

This construction has served in some places for more than twenty years and it is still in use today. It is *not* a new construction.



Sunex Securityflex and Duracord

ANACONDA WIRE & CABLE COMPANY

CINCINNATI CHAINS, BITS *and* CUTTER BARS

HELP KEEP COAL OUTPUT AHEAD OF WAR TIME DEMANDS

CINCINNATI DUPLEX CUTTER CHAINS AND BITS INCREASE PRODUCTION—REDUCE COSTLY DELAYS

FACTORIES are humming day and night . . . . . three shifts a day . . . . . seven days a week. Industrial production depends on coal output for power. Cincinnati Long Life Cutter Chains . . . reversible, double-ended Bits . . . and sturdy Cutter Bars are helping thousands of mine operators all over the country meet increased production schedules. Don't let delays in cutting rooms slow you down . . . get in touch with us today. We'll prove to you that Cincinnati cutting equipment increases production . . . reduces cutting costs . . . decreases maintenance or repair service and saves power.

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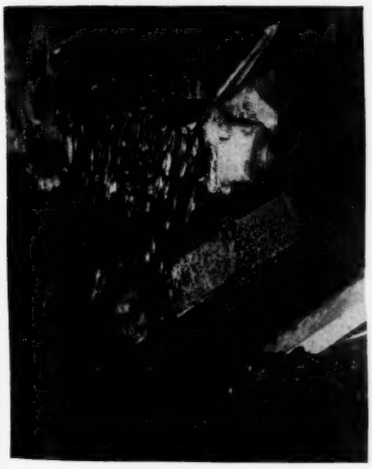
TIMELY OPERATING IDEAS

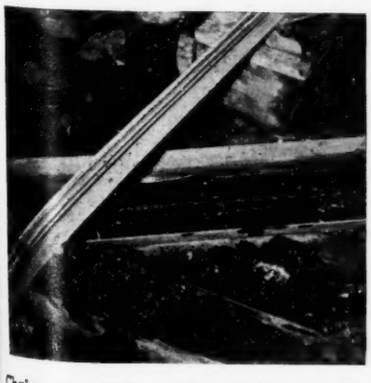
Chain Conveyor Carries Water From Bottom Lifting

Arriving at a drift mine at the beginning of the early morning shift, a *Coal Age* editor noticed a chain conveyor discharging water only and in considerable quantity to a chute that led down the hillside to a refuse dump. It was found that this water was being carried 400 ft. from a point underground where a mobile machine was loading bottom material into the conveyor to gain height for a new haulway.

This haulway had gone slightly to the dip and considerable water accumulated at the face between shifts. To get rid of this water the drilling and loading crews simply shoveled it into the chain conveyor. Part of the way the conveyor line is level but approaching the outcrop it dips in favor of the load. This conveyor, Joy make with 10-hp. drive, was practically new and the joints seemed to be watertight or at least became so by dirt filling any cracks.



Mine conveyor discharging water at the drift portal and into a chute leading to a refuse pile.



Chain conveyor temporarily handling water.

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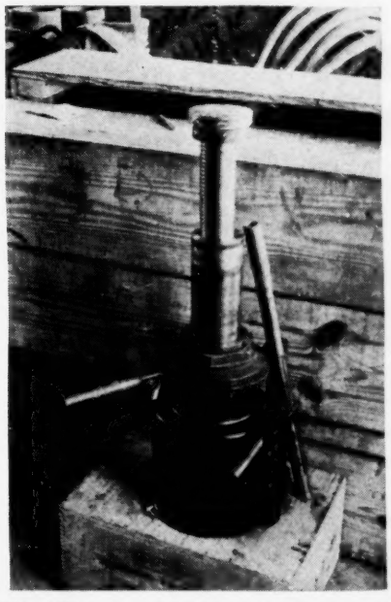
Leakless Hydraulic Jack Made of Odds and Ends

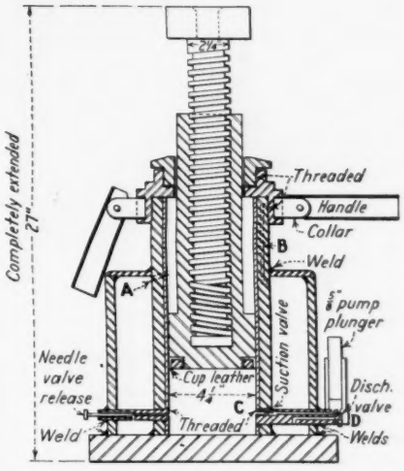
Knowing how and doing a finished job of machine work, Gus Sayrs, machinist for Delta Coal Mining Co., Marion, Ill., made the handsome 40-ton hydraulic jack illustrated from scrap materials picked up here and there. The base is a scrap of 1¼-in. steel plate. To this is welded the hydraulic cylinder, and the oil reservoir is a short piece of 8-in. steel pipe. The oil valves are steel balls from discarded ball bearings.



This efficient and leakless jack was made in the shop of Delta Coal Mining Co.

Most of the parts are machined and finished all over. Collapsible handles are placed at convenient height for lifting the jack clear of the floor. The handles are hinged to a collar that is free to rotate horizontally, so they may not interfere with equipment or parts being lifted. The completed jack is painted to protect the finish.

Besides being light in weight, strong and compact, there is no oil leakage. Provision is made to return to the tank any oil that may leak past the cup leather on the plunger.

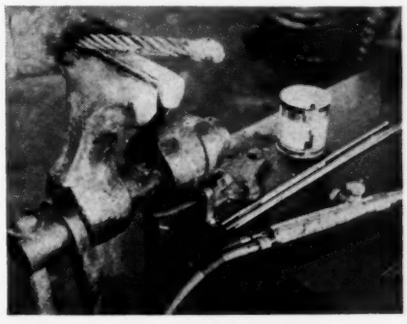


Cross-section of handy leakproof hydraulic jack. *A*—full extension oil release; *B*—return leakage oil to tanks; *C*—valve seats threaded into tapped hole; *D*—plug threaded into hole to hold valve spring.

•

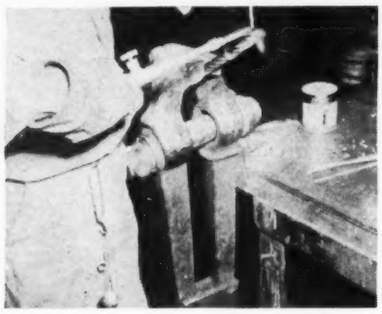
Brazed Ends Make Wire Rope Safer to Handle

"Where clip fastenings or other means of attachment are used that expose the end of a wire rope," F. L. Spangler, M.E., points out, "there is constant danger that those handling the rope may receive lacerations or puncture wounds from the sharp wires at the rope end.



With the end bronze-welded, the wire rope can be handled without the hazard of lacerations and puncture wounds caused by exposed wire ends.

This form of injury is said by some medical authorities to be especially dangerous, since it is likely to be deep-seated and the injured man may consider the wound as too superficial to require immediate attention. It is not uncommon for blood poisoning to develop where immediate treatment is not given. And now that we need every ounce of production energy, this is no time to have workmen laid up because of injury.



Covering the sharp wires at the rope end by applying bronze with a welding torch.

"A simple method of eliminating the hazard of sharp exposed rope ends is to braze the end of the rope with a bronze welding rod, running the bronze back for a distance of an inch or two from the end. When properly done, the bronze covers all the wire ends, and it also has the advantage of holding the rope end intact so that seizings can be removed.

"Ends of preformed ropes can be brazed without applying a seizing beforehand, since preforming removes all unbalanced stresses in the rope wires and strands so all wires hold their position in the rope without the need for using seizings. Even so, a single seizing will insure that the rope construction will not be flattened during the cutting operation. If the rope is not preformed, it is recommended that two or three seizings be applied—one close to the end of the rope and the others a short distance (4 to 6 in.) apart.

"Where end brazing is done, either the same torch or a cutting torch may be used to sever the rope before bronze is applied to the end."

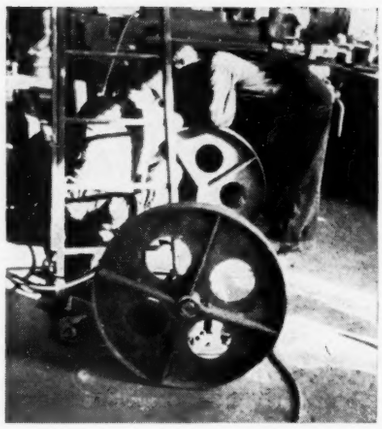
•

Steel Rims on Pump Truck Substitute for Rubber

Delta Coal Mining Co., Marion, Ill., uses what it can get to make what it needs. For instance, the neat steel wheels shown in the accompanying illustration are to be part of a truck mounting a portable strip-pit pump—a substitute for the customary rubber-tired truck.

A gas torch, so mounted as to cut circles, cuts out the steel disk and the five holes in it, forming the web of the wheel. The cutting is so accurate and smooth that no machining is required to assemble the parts.

The hub is driven in and welded to the web. Braces extend from the hub to the tire and are welded in place. Starting



This handsome truck wheel is good for the duration.

with a steel bar for the wheel tread, one end is welded to the web, then bent around the circumference and welded at intervals.

These are roller-bearing wheels. The hub is bored and the axle turned to leave space for the rollers to be slipped in. The rollers are cut from cold-rolled steel shafting. There is no cage, which matters little, since it is not frequently moved.

•

Light Bulb Used in Float Instead of Copper Ball

The suggestion that burned-out light bulbs be used for floats instead of copper balls (hard to obtain) or wood floats (likely to become waterlogged) is passed on by W. H. Luxton, Linton, Ind., who reports that the idea came from his son, who in turn got it from a Detroit defense worker. The bulb may be welded, soldered, brazed or otherwise fastened to the opening lever, and various sizes will give various operating forces. Places around the mines where such floats might be employed, says Mr. Luxton, include float mechanisms for opening and closing valves in suction lines to roadside sumps.

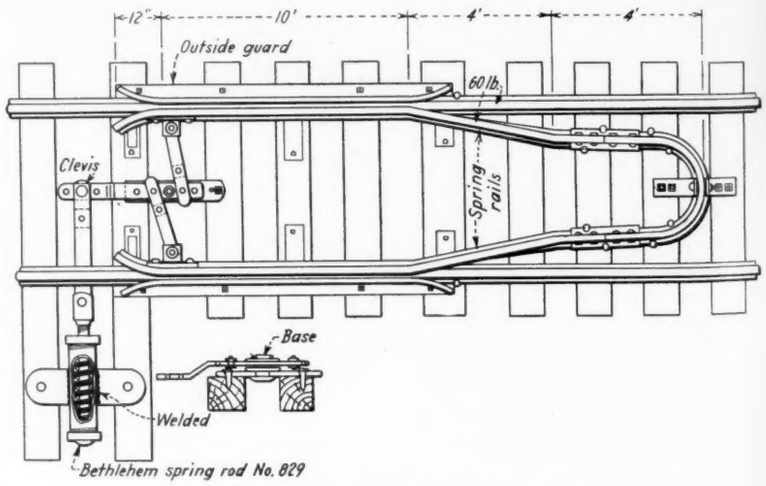
What's the Answer?

Problems that crop up in every-day operation of coal mines usually require immediate answers, regardless of their character. Whether it be a safe way of guarding trolley and feeder wires, a signal for controlling trips, or a quick and economical method of repairing a breakdown, to mention but a few examples, on-the-spot solutions are imperative. These pages contain the cumulative experience of mining men who have met and overcome emergencies that arise in getting out the coal, and offer tried and proved answers for many operating problems. Your idea for saving time and dollars belongs among them. Send it in. A sketch or photograph may make it clearer. Acceptable ideas are paid for at the rate of $5 or more each on publication.

Retarder Prevents Shock and Damage to Mine Cars

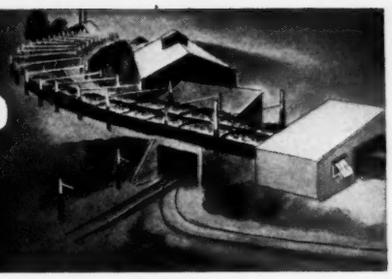
With the growth of mechanization in mining, many operations are using larger mine cars—5 to 12 tonners—which calls for a stronger retarder. With this fact in mind D. R. Richardson, mechanical engineer, New Kensington, Pa., has devised a simple retarder designed on the plan shown in the accompanying illustration.

Since it is not practicable to provide an empty grade exactly suitable for every type of car, says Mr. Richardson, a retarder placed close enough to the "empty" hole so that a car could not gain a high speed before it bumped would seem to be called for. Of course, the retarder should be so placed that entanglement with the link would not cause a derailment and should provide sufficient resistance on the bumper to slow down the car properly. The Richardson retarder can be operated mechanically by a spring, as shown in the sketch, or by an electric magnet.



Plan of retarder for heavy mine cars.

COAL AGE NEWS ROUND-UP



Most Bituminous Mines Go to Six Days; Union Demands $2 Wage Increase

Six-Day Contracts Signed by Most Bituminous Mines—Union Demands $2 Bituminous Wage Increase—Little Headway Made in Starting Negotiations Earlier — Government Agencies Tighten Up on Manpower

WITH MOST of the bituminous industry signing up for a six-day week, February brought demands from the United Mine Workers for a $2 daily wage increase when the present soft-coal wage contract expires March 31. The $2 demand, it appeared, would be pressed despite conflicts with the "Little Steel" formula and other government wage stabilization measures. At the same time, the United Mine Workers showed little desire to advance the dates of contract negotiations despite requests by operators and government officials.

Following the lead of operators in northern West Virginia and western and central Pennsylvania, most of the rest of the country's bituminous mines had accepted the United Mine Workers' six-day-week contract at the time this issue of *Coal Age* was closed. Districts and dates were: Ohio-northern West Virginia Panhandle, Feb. 3; southern West Virginia-eastern Kentucky, Feb. 10; Virginia and Tennessee, Feb. 11; Illinois, except for a few mines previously accepting the contract, Feb. 11; western Kentucky, Feb. 12-14. Mines in the Far West already were covered by agreements providing for six- and seven-day schedules. Other regions not listed above were expected to come into the fold shortly.

Assailing the "Little Steel" formula and the War Labor Board, the policy committee of the United Mine Workers, meeting in Washington Feb. 3, left anthracite matters to a separate convention and asked a $2 a day wage increase and a national conference in the bituminous industry. The text of the bituminous demands follows:

1. In consideration of the pertinent factors, equities and common justice, a wage increase of $2 per day on the day and monthly rates, with the proper related increases on this basis to tonnage, yardage and deadwork rates, be demanded as being necessary to adequately and fairly compensate the men employed in the coal-mining industry.
2. That every effort be made to arrange a national joint wage scale meeting with the bituminous coal operators of the United States for the purpose of working out a national agreement on a nation-wide basis so that conferences may be facilitated and speedy conclusions arrived at.
3. That after all our respective bituminous districts have had an opportunity to canvass matters relating to supplemental and correlating demands concerning such matters as ordinarily handled in negotiations shall be determined by the reconvened meeting of this international policy committee to be held previous to the start of negotiations with the operators at which time a complete program, including the basic wage demand set forth herein, shall be presented to the operators as the basis of negotiations for a new contract.

Although it contended that the "coal miners have a right to prove a $2 day wage increase is justified," the union found much official and unofficial sentiment arraigned against it. Chairman Davis, of the War Labor Board, took issue with a statement by John Lewis that the board's wage policy is "an outrageous breach and violation of the no-strike agreement between labor, industry and government made in December, 1941." James F. Byrnes, Economic Stabilization Director, in a radio address Feb. 9, reiterated the government's policy of stabilizing wages on the basis of Sept. 15, 1942, with "no further increases in wages beyond the 'Little Steel' formula except in limited and special cases to correct patently gross inequities and to rectify plainly substandard wages." On Feb. 12, Senator George, chairman of the Senate Finance Committee, was quoted as asserting that the government cannot afford to accede to the $2 increase.

Following the Feb. 3 meeting, the anthracite tri-district scale convention was scheduled for March 3. Indications were that this group also would demand a $2 increase. A "substantial" raise also was demanded by the Progressive Miners of America, in Illinois, in a scale convention Feb. 18.

Attempts to advance the dates for starting negotiations for the new contracts got under way even before the union meeting Feb. 3, the proposal originating with the Southern Coal Producers' Association and receiving informal support from Solid Fuels Coordinator Ickes. The union demurred, however, on the ground that the question of working a six-day week had not been settled. Getting more specific, Mr. Ickes suggested Feb. 22 for bituminous and March 22 for anthracite as the latest dates to start in letters to the union and the heads of negotiating groups for the northern and southern bituminous operators and the anthracite operators. Lewis finally yielded Feb. 18 to the extent of advancing the date for bituminous negotiations from March 14 to March 10. The following day, northern operators urged Lewis to reconsider. Meantime, anthracite operators announced that they were ready to begin any time. On Feb. 19, Edward R. Burke, president, Southern Coal Producers' Association, was reported to have stated that the operators would present a firm front against a wage increase.

Manpower remained as one of coal's major problems despite lengthening the work week from 35 to 42 hours, as pointed out elsewhere in this issue. Calls for men continued from the Far West, especially Utah. Eastern Kentucky, among other regions, also reported a substantial shortage of men, although this was dis-

U.M.W. AFTER OFFICIALS

A drive to get mine officials into the United Mine Workers was announced by that organization Feb. 20 in a letter to all district and local union officials. Declaring that the Mine Officials' Union of America had been taken into the U.M.W. by action of the international executive board Feb. 5, the letter stated:

"Local union officers and members of mine committees are instructed as follows: (a) Between this date and March 31, 1943, each mine foreman, assistant mine foreman, dock boss, night boss, fireboss, mine examiner, watchman, coal inspector, mine clerk and all other employees heretofore exempted from membership shall be presented application blanks for membership in the United Mine Workers of America and requested to join this union. . . . (d) Any local unions encountering opposition to this program, on the part of any coal company or any individual whatsoever, will report the facts and circumstances of such opposition to their district officers and await advice and instructions before taking any further action themselves."

puted by union officials, notably Sam Caddy, president, District 30. Nevertheless, plans for placing this region under a job stabilization program similar to that in effect in the Louisville area were actively discussed by representatives of the War Manpower Commission.

The Presidential order of Feb. 9 fixing 48 hours as the minimum work week for the duration was looked upon by many as offering further relief if and when it should be put into effect in coal mining, although there was no disposition in February to believe that it would be applied immediately in any coal-mining area. The previous day (Feb. 8) a national service bill authorizing the drafting of men and women for any and all forms of work connected with the war effort was introduced in Congress.

Selective Service and the War Manpower Commission, however, had moved in with tighter control even earlier and promised that drafting would be more rigid than ever before. Selective Service early in the month issued a list of nonessential occupations and stated that men in such occupations between 18 and 38 would be drafted regardless of dependents. This order, it was expected, would drive men out of such occupations into war industries. On Feb. 4, WMC in effect froze employees in their jobs in 32 areas throughout the country by imposing hiring controls. None of these areas, however, included coal-mining centers, although it was stated that they might be added later if conditions warrant.

More drafting in the critical age limits was envisioned in Justice Byrnes' radio address of Feb. 9, previously alluded to. General Hershey, Selective Service Director, made it more emphatic in testifying before a Congressional committee Feb. 11. "Before the end of this year," he declared, "the great majority of all physically fit men between 18 and 38—and I repeat 'of all'—regardless of occupation or dependents, will be in the armed services." This was in contrast with a statement by War Manpower Commissioner McNutt on Feb. 10 that "essential civilian activities are on an equal plane with basic war industries in our war effort. Registrants engaged in such civilian activities as agriculture, food processing, mining, textiles, etc., are equally protected with respect to occupational classification and dependency status as those engaged in basic war industries."

Strikes were much in the minority in February. One was in progress Feb. 1 at the No. 1 mine of the Wasson Coal Co., Harrisburg, Ill., in opposition to staggering to permit working a six-day week without overtime. On Feb. 4, 1,500 men walked out at the Maxwell mine of the H. C. Frick Coke Co., Brownsville, Pa., over the dismissal of three motormen in a controversy over supply hauling. In the anthracite region, the miners not only went on the six-day week in full force but, through the medium of the newly organized "Anthracite Victory Committee," adopted a resolution pledging no strikes for the duration of the war.

Canada's need for coal and for men to work the mines continued critical in February, also marked by a few strikes in the western provinces. To help take care of matters, Dominion officials were actively engaged in arranging for furloughing men from the armed forces to supplement those now on the job.

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Campbell Appointed Chairman Of A.M.C. Sessions

George F. Campbell, vice president and general manager, Old Ben Coal Corp., Chicago, has been named as chairman of the 1943 coal-mine conference of the American Mining Congress, to be held May 17 and 18 in Cincinnati, Ohio. Announcement of the appointment was made by Julian D. Conover, A.M.C. secretary, Washington, D. C.

To conserve car movement and to conform to government war policies, the display of mining machinery and materials has been abandoned in the last two years. It was stated, however, that complete plans for the industry conference will be formulated soon in local or regional meetings. These are to be held in Lexington, Ky.; Birmingham, Ala.; Charleston, W. Va.; Pittsburgh, Chicago and Evansville, Ind.

Keeping Step With Coal Demand

Bituminous Coal Stocks

	Thousands Net Tons Jan. 1 1943	P.C. Change From Dec. 1 1942	P.C. Change From Jan. 1 1942
Electric power utilities	19,982	−3.0	+55.8
Byproduct coke ovens	10,721	−3.9	+20.4
Steel and rolling mills	1,141	−5.4	+17.9
Railroads (Class 1)	12,582	−5.3	+22.9
Other industrials*	31,277	−5.1	+52.7
Total	75,703	−4.5	+41.7

Bituminous Coal Consumption

	Thousands Net Tons Dec. 1942	P.C. Change From Nov. 1942	P.C. Change From Dec. 1941
Electric power utilities	6,148	+10.4	+ 4.3
Byproduct coke ovens	7,583	+ 3.4	+ 3.1
Steel and rolling mills	1,033	+19.1	+ 4.9
Railroads (Class 1)	11,145	+ 8.5	+20.8
Other industrials*	15,211	+11.2	+10.7
Total	41,120	+ 9.1	+10.5

* Includes beehive ovens, coal-gas retorts and cement mills.

Coal Production

Bituminous

Month of January, 1943, net tons	47,029,000
P.c. change from January, 1942	−3.8

Anthracite

Month of January, 1943, net tons	4,314,000
P.c. change from January, 1942	−9.6

Sales of Domestic Stokers Vs. Oil Burners

	Coal Stokers	Oil Burners
December, 1942	1,447	1,876
P.c. change from Dec., 1941	−82.6	−86.4
January-December, 1942	82,791	55,331
P.c. change from Jan.-Dec., 1941	−56.1	−72.1

Index of Business Activity*

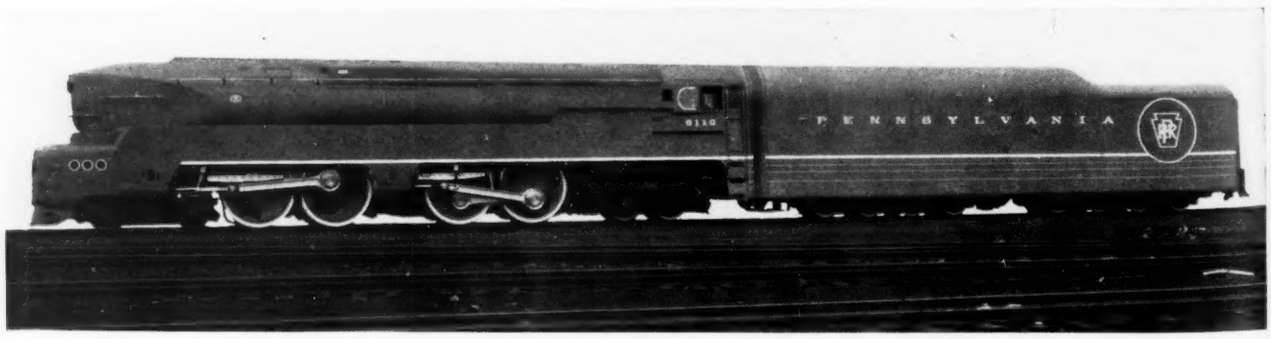
Week ended Feb. 20 (preliminary)	197.7
P.c. change from month earlier	+12.6
P.c. change from year earlier	+14.3

* *Business Week*, Feb. 27.

Electric Power Output†

Week ended Feb. 20, kw.-hr.	3,948,749,000
P.c. change from month earlier	− 0.6
P.c. change from year earlier	+15.3

† Edison Electric Institute.



Pennsylvania Railroad's New Passenger Locomotives Burn Bituminous Coal

One of two new Class 4-4-4-4, 19 SR, 1 passenger locomotives (No. 6110) built in 1942 by the Baldwin Locomotive Works for the P.R.R. (railway company's class: engine T-1; tender 180P76). She has four 19¾x26-in. cylinders; boiler working pressure, 300 lb.; fuel, bituminous coal; 80-in. outside-diameter driving wheels; engine wheelbase, 51 ft. 11 in., total engine and tender 107 ft.; weight of engine is 497,200 lb.; tender's weight, fully loaded, is 433,000 lb.; tractive force is 65,000 lb.; tender's tank capacity is 19,500 U. S. gal.; fuel capacity, 41 tons. Equipment includes Type A-S superheater, feed water heater, stoker, five circulators, power reverse, one-piece cast-steel locomotive bed with integral cylinders, and air brake on all front-truck, trailer-truck, driving and tender wheels, with two 8½-in. cross-compound air pumps. Engine 6111 is equipped with booster developing about 13,500 lb. tractive force.

This Year Rubber Is Tapped from Test Tubes

Synthetic Rubber Already Is Working for Users of Mechanical Rubber Goods

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Our engineers have been working with synthetic rubber since 1921. During this period they have learned that no one synthetic should be used for all types of mechanical rubber goods. They have found where and how synthetic is superior to natural rubber, where it is equally as good, where it falls short. They know what uses each of the five basic commercial types of synthetic rubber is best suited for — Neoprene, Buna-S, Buna-N, Butyl, or Thiokol—and how to compound the specific synthetic rubber for the specific task. U. S. Rubber has used all five types and knows which one to select for the performance required.

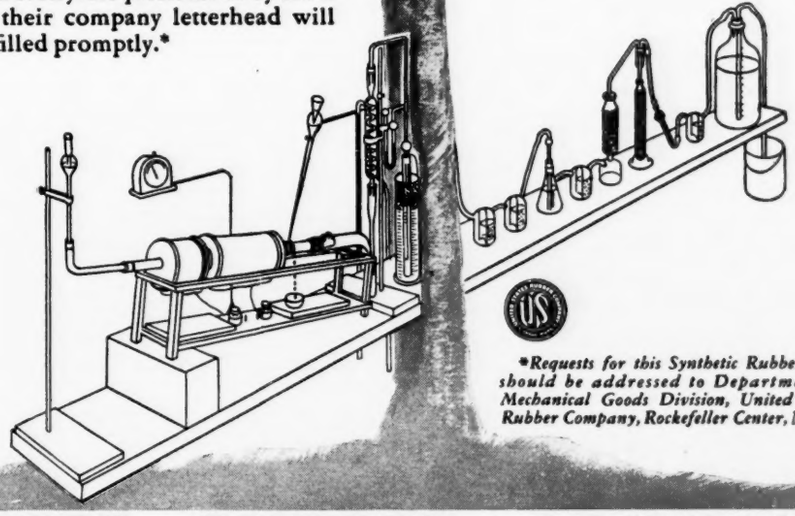
Information based on the results of vast experiments and practical applications of synthetic rubber has been incorporated in a new comprehensive book, *The Five Commercial Types of Synthetic Rubber.*

This informative book traces the history of synthetic rubber from the earliest experiments of Michael Faraday to the present. It discusses each of the basic types of synthetic rubber, tells where it has been used successfully in United States Rubber Company products, and compares its properties with natural rubber. It tells how synthetic rubber is made. It is a detailed answer to the most vital question of the day.

We feel that *The Five Commercial Types of Synthetic Rubber* is a publication of real importance to men of industry. Requests made by them on their company letterhead will be filled promptly.*

The successful use of synthetic rubber in mechanical rubber goods and the insurance of fully dependable service depend largely upon the skill of the manufacturer and compounder. Each of the five basic commercial types of synthetic permits a myriad of variations.

The United States Rubber Company has been developing and improving rubber products for one hundred years. Today, the same vast resources for research and development that resulted in some of the most spectacular achievements in the rubber industry are being devoted to the problem of synthetic rubber. A great backlog of knowledge already has been built. More is being constantly added.



**Requests for this Synthetic Rubber Book should be addressed to Department 11 Mechanical Goods Division, United States Rubber Company, Rockefeller Center, N.Y. C.*

UNITED STATES RUBBER COMPANY

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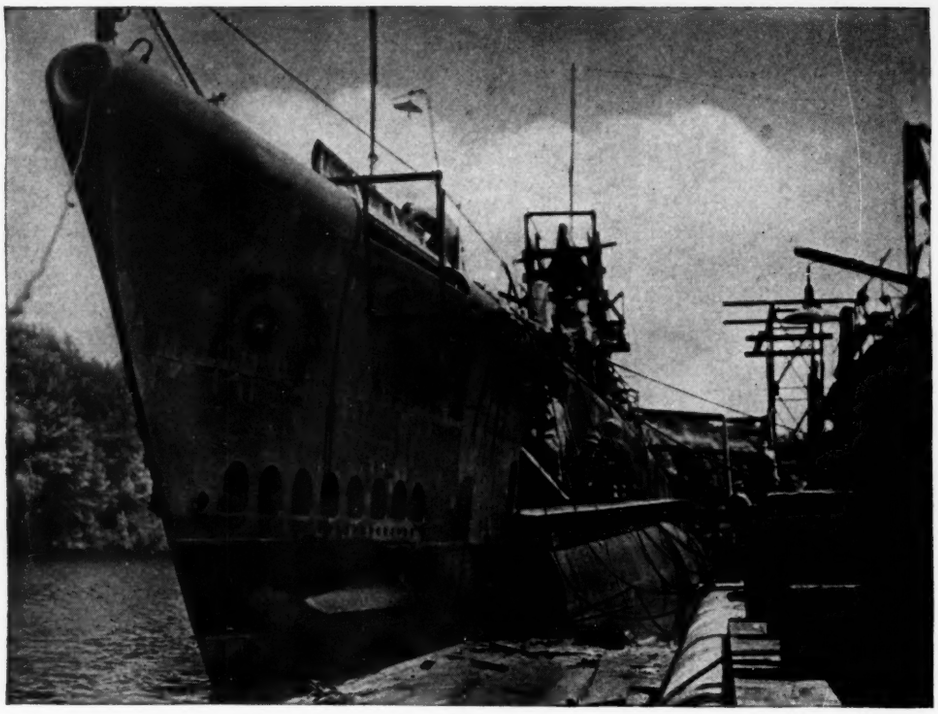

PHOTO: OFFICE WAR INFORMATION

Another American Submarine soon to be in the thick of the fighting

Everyone reading of the thrilling activities of the American submarines especially in Japanese waters cannot praise our men too highly who operate these boats.

Submarines are needed in our plan of action. In the construction and operation of every submarine considerable Industrial Rubber Products are required. Quaker is playing an important part in supplying our Government with the vital rubber products to keep these sea-fighting machines in A-1 condition.

These and many other units of the Armed Forces, as well as plants on War orders, for which Quaker is producing, have the right of way. You would not want it otherwise.

Should your order with us seem a trifle long in reaching you, your patience is requested as we are doing everything possible to spread what permissible civilian products we can manufacture equitably among our many customers.

Everyone can help during these critical days. Use all your rubber products carefully. Take care of what you already have. When its usefulness is over, send to proper rubber collecting station to be turned in as scrap. No piece of rubber is too small; old overshoes, galoshes, piece of garden hose, discarded rubber mat, hot water bottle, or any article made of rubber.

Your scrap rubber with that of other local citizens will help materially to supply the necessary rubber products needed so badly to keep the War machine in fullest operation. Thanks for your help.

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Neither is it patriotic to allow your plant to lose production for want of Industrial Rubber Products.

The coal industry is recognized as vital by the Government, and an industry where Industrial Rubber Products are permitted.

Consult Quaker whenever Industrial Rubber Products should be used. Our experience of manufacturing and knowledge of current regulations are at your service.

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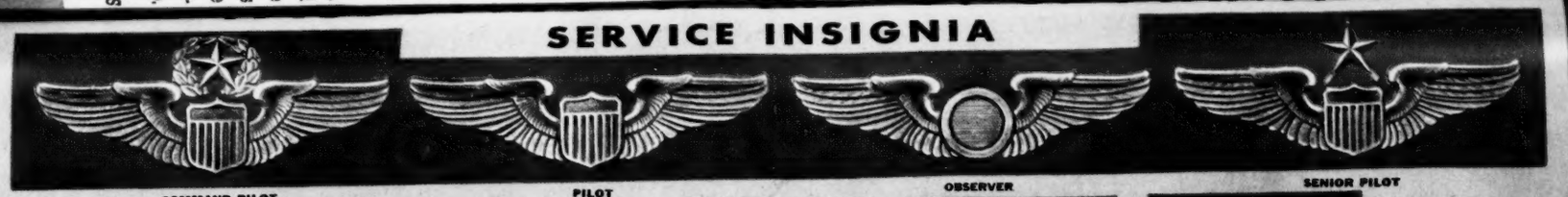



GENERAL

LT. GENERAL


MAJOR GENERAL


BRIG. GENERAL


COLONEL


LT. COLONEL


MAJOR


CAPTAIN


1st LIEUT.


2nd LIEUT.


1st CL. PRIVATE


9th CL. SPEC.


1st CLASS SPEC.


CORPORAL


SERGEANT


STAFF SGT.


TECHNICAL SGT.


1st SERGEANT


MASTER SERGEANT


AIR CORPS


QUARTERMASTER CORPS

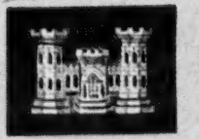

ADJ. GEN.'S DEPT.


GENERAL STAFF

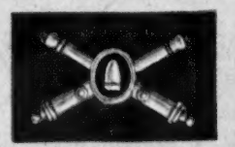

ENLISTED MAN'S LAPEL U. S.


INSPECT. GEN.'S DEPT.


U. S. MILITARY ACAD. (West Point)


ENGINEERS


FIELD ARTILLERY


COAST ARTILLERY


CAVALRY


★ INFANTRY


ORDNANCE


SIGNAL CORPS


GENERAL'S AIDE


BAND


ENLISTED MAN'S LAPEL BRANCH INSIG.


OFFICER'S U. S.


MED. CORPS


MED. ADMIN.

VETERINARY CORPS

DENT. CORPS

SAN. CORPS

NURSES' CORPS

ARMY NURSE SCHOOL

NAT'L GUARD BUR.

FINANCE DEPT.

CHAPLAIN (Christian)

CHEM. WARF. SERV.

CHAPLAIN (Jewish)

MIL. INTELL.

MILITARY POLICE

ENLISTED MAN'S CAP EMB.

UNASSIGNED OFFICER

OFFICER'S CAP EMB.

★ Tank Units are designated by tank below crossed Infantry rifles.

★ Anti-tank Units are designated by crossed Infantry rifles and letters "A" and "T" at left and right respectively.

JUDGE ADV. GEN.'S DEPT.

WARRANT OFFICER

WARRANT OFFICER'S CAP EMB.

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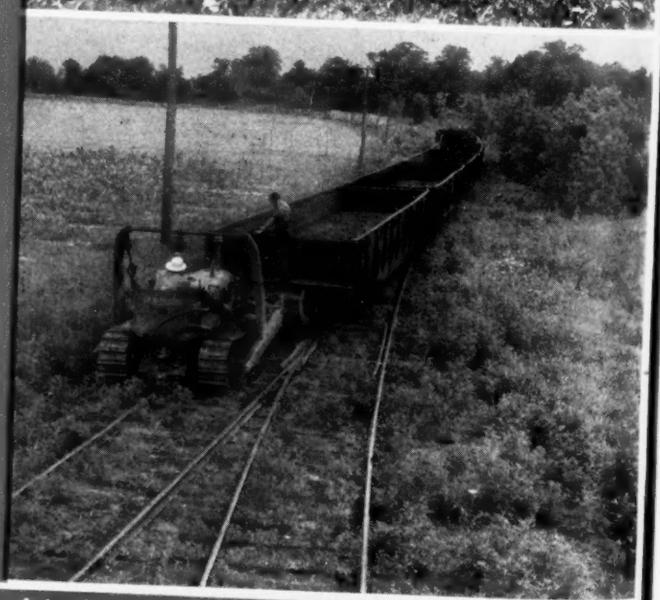
Left: Baker Bulldozer on Allis-Chalmers Tractor speeds dipper loading, eliminating frequent respotting of shovel and hogs out bone and rash at an Illinois mine.

Below: Baker levels slack at an Ohio mine.

Bottom: Baker Gradebuilder is never idle at this Brazil, Indiana, mine—it builds roads, cleans pit floors and is shown spotting cars.



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Eastern Oil Situation Somewhat Easier; Pressure for Coal Use Continued

"SOMEWHAT EASIER" would perhaps describe the fuel situation in late January and February, although efforts to promote the production of coal, the further conversion of oil-burning equipment and the movement of oil to the East continued unabated. Emergency fuel-oil priorities were set up in the East, and at the same time the longer work week in coal mining began to show up in production.

Compared with 1,100,000 to 1,200,000 tons for most of the fourth quarter of 1942, anthracite output rose to 1,322,000 tons for the week ended Jan. 30, the first under the six-day schedule. Output in the week ended Feb. 6 was 1,344,000 tons; Feb. 13, 1,337,000 tons. Bituminous mines were a little slower in getting under way, but for the week ended Feb. 6 output rose to 11,880,000 tons, going to 12,280,000 tons the week ended Feb. 13. Preparations were under way to make use of this additional producing capacity by, among other things, adding to stockpiles, still considered too low under present conditions. With the resumption of production on a six-day schedule, Solid Fuels Coordinator Ickes lifted Feb. 1 the restrictions on shipment of anthracite west of Erie, Pa., and to Canada.

Oil Situation Better

While a further cut of about 11 percent in the value of Period 4 oil-rationing coupons was made in several of the northeastern states early in February, the previous cuts, including 40 percent in supplies to non-essential industries (February *Coal Age*, p. 155) and the elimination of pleasure driving, eased the situation in the 17 eastern States and the District of Columbia, most short of this fuel. Priorities were established in serving oil consumers by placing those on dealers' lists in 1942 in a preferred category, others being apportioned what was left. In a companion amendment to Petroleum Administration for War Order No. 1, however, steps were taken to see that distributors would receive sufficient supplies to serve all customers by broadening the sources from which they could purchase in case their regular suppliers could not furnish their requirements.

Pressure for conversion continued, and was extended to other areas in February. The Atlanta regional office of OPA, WPB and PAW ordered oil consumers in the five southeastern States to convert immediately to coal. "It is possible," the joint statement of these agencies declared, "that non-essential establishments which consume oil for heating or processing and cannot convert to solid fuel may have to be closed." In addition, "no further ration of fuel oil beyond the date set for each case by the inter-agency conversion committee will be granted to any user except private dwellings unless the user can present a certificate that conversion to an alternative fuel is impossible or that materials necessary to conversion are not obtainable."

OPA and other government agencies continued to push for the distribution of coal stoves and heaters in the 30-State oil-rationed area, and on Jan. 29 announced that such stoves were being made available to provide supplementary heat for families using central oil heating systems but whose present oil ration is insufficient for health or comfort. On Feb. 1, Joel Dean, director, OPA fuel rationing division, declared that 273,082 coal and wood heating stoves were shipped in the period Dec. 1, 1942-Jan. 16, 1943. Some 218,773 were shipped into the 30 oil-rationed States. WPB facilitated the program by extending the application of Order L-23-d to March 31, 1943, providing an additional two months during which Class C manufacturers may produce coal and wood stoves and heaters. Also, the Jeffersonville Quartermaster Depot agreed to postpone deliveries, upon appeal, under Army contracts for No. 1 heaters until April 30, 1943, to increase the supply of stoves for civilian use.

A campaign to convert plants using 10,000 gal. of oil or more annually was begun in Ohio in February, and in Boston the regional office of the War Production Board opened a "Fuel Conversion Show" in cooperation with the Office of Solid Fuels Coordination, Petroleum Administration for War, OPA and the Commonwealth of Massachusetts. Held in the exhibit room of Anthracite Industries, Inc., the show features the slogan "It's 4 to 1 You Can Convert" and the theme song "Keep the Home Fires Burning." It is devoted to demonstrating conversion parts and equipment, teaching the proper use and control of solid fuel and putting visitors in touch with suppliers of conversion grates, parts, labor and solid fuel.

As another step in facilitating conversion, stoker manufacturers and WPB held a round-table discussion in Washington Feb. 8 on methods of speeding the job, including an expanded manufacturing program. Preference in the distribution of stokers, it was stated, is given first to New England, then the New York territory and finally to other sections of the country.

Increased shipments by tank car and in steel drums also eased the eastern oil picture. The Defense Plant Corp. authorized contracts for converting 100 box cars to oil carriers.

Oil from Longview, Texas, reached the terminal of the new 24-in. line at Norris City, Ill., at 2:10 p.m. Feb. 13, and on Feb. 19, after commemorative ceremonies, the first train of tank cars pulled out for the East. Oil flow is expected to reach its maximum of 300,000 bbl. daily about April 1. Meanwhile, construction of the extension line to the East was being pushed, with completion scheduled for June 1. Construction of the new 20-in. "products" line from Baytown, Texas, to Seymour, Ind., was expected to start in March, with the possibility that it also would be extended to the east coast. Despite these steps, Petroleum Administrator Ickes held out little hope of any immediate increase in the supply of petroleum products for civilian use, stating that the bulk of the new shipments would be necessary for military purposes abroad.

Further tightness in the supply of natural, mixed and manufactured gas appeared in certain areas of the East and Middle West. One result was a WPB request that consumers in western and southern New York and western Pennsylvania curtail consumption 25 percent in February and March. Gas is expected to become a major problem next winter. To help Ohio and West Virginia natural gas wells supply war consumers in the Cleveland-Akron-Youngston areas of Ohio, it was proposed that Panhandle Eastern Pipe Line Co.'s facilities be tapped by a new short line and

New England chiefs of four federal war agencies look over the exhibits at Boston's "Fuel Conversion Show."

COMING MEETINGS

- Midwest Power Conference: April 9-10, Palmer House, Chicago.
- American Wood Preservers' Association: annual meeting, April 27, Palmer House, Chicago.
- Mine Inspectors' Institute of America: annual convention, May 24-25, Deshler-Wallick Hotel, Columbus, Ohio.
- Illinois Mining Institute: 25th annual boat trip and summer meeting, June 4-6, from St. Louis.

the gaps in the second line in Panhandle's dual system be filled so that Texas natural gas can be diverted to these Ohio areas. WPB approval was requested.

Canada also pressed measures for increasing coal production and considered oil rationing. On Jan. 30, the Department of Munitions and Supply announced that a survey of householders' oil requirements had been begun "as a preparatory measure for rationing domestic fuel oil, if such a step should become necessary, during the winter of 1943-44." Newfoundland instituted coal rationing effective March 1 to conserve existing stocks. No more than ½ ton can be sold to a householder at one time, and such householder must then have no more than ¼ ton on hand.

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New Owner Mechanizing Lytle Colliery

Complete mechanization has been started at the one-time Lytle colliery, M. A. Hanna Coal Co., located at Lytle, near Minersville, Pa., by its new owners, the Moffat & Schrader Coal Co., incorporated as the M & S Coal Co., with a capitalization of $100,000. The active leadership of this company is in the hands of A. J. Schrader, of A. J. Schrader, Inc., Scranton, Pa., long active in construction and in numerous coal-stripping operations.

In one level alone—the Fifth—Jeffrey, Ladel, Vulcan and Joy machinery has been installed and placed in operation. One 26-in. belt conveyor line, 1,250 ft. long, has been installed, and another tandem belt conveyor line having a length of 4,000 ft. is in course of installation. This level has a seam averaging 12 ft.

Among other operators from Luzerne and Lackawanna counties in Pennsylvania who have opened new operations or purchased established mines in Schuylkill County is the Pagnotti Coal interests, of Pittston, Pa., now operating Indian Head colliery, Tremont, Pa. The Jermyn-Green combination, which operates No. 14 colliery, near Pittston, Pa., is constructing a large colliery at Phoenix Park, Pa. Frank Correale, of the Correale Construction Co., Hazleton, Pa., is now the operator of the Necho Coal Co., Donaldson, Pa., and Frank L. Pinola, Pittston attorney, is now the guiding hand over the Buck Run Coal Co., Buck Run, Pa.

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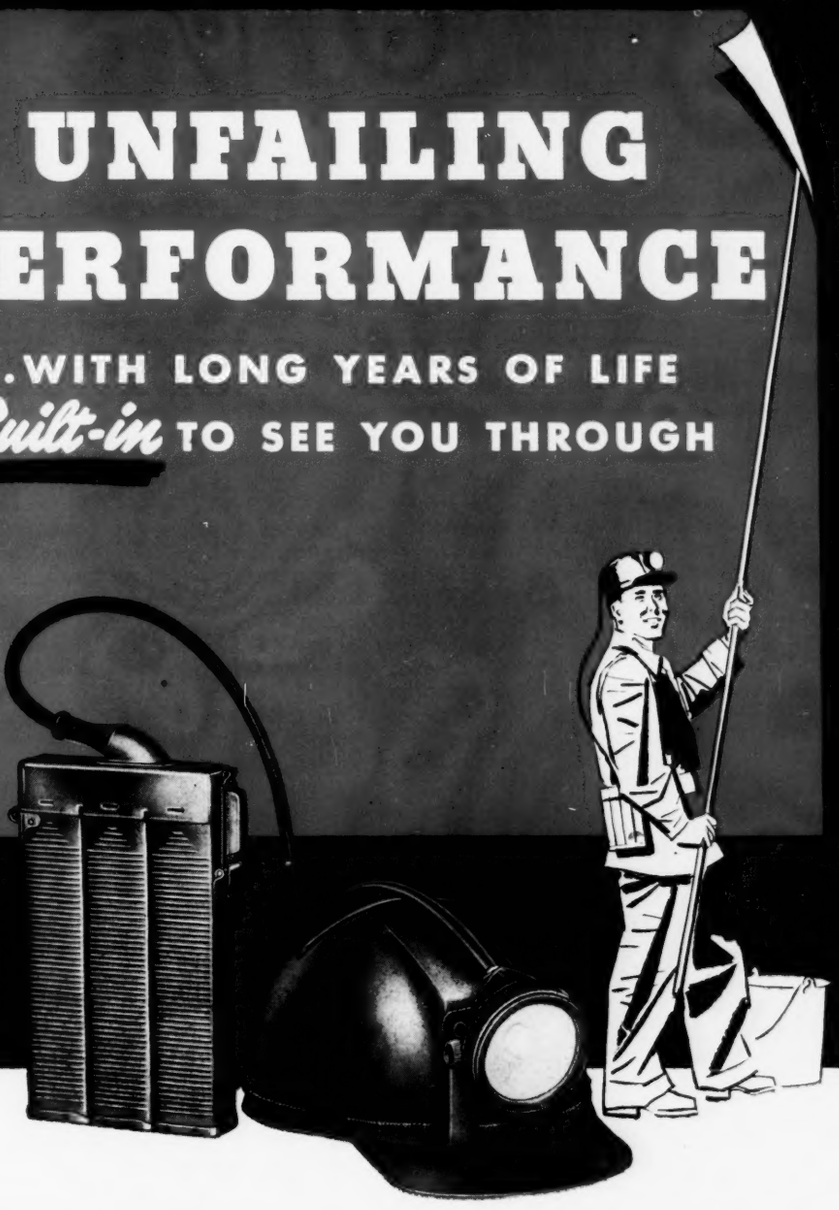

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EDISON ELECTRIC CAP LAMPS **M.S.A. COMFO CAPS**

New Slants on Combustion, Stripping and Coke Interest Engineers at New York Meeting

How to Handle Fly Ash and Clinkers in Domestic Stokers—Behavior of Anthracite in a Cupola—Mining With Excavators in Anthracite Region and on Ohio River—Coke for Blast Furnaces, East and West

HIGHLIGHTS in the meeting of the American Institute of Mining & Metallurgical Engineers, Coal Division, held Feb. 16 and 17, at the Engineering Societies Building, New York, were: (1) collection of fly ash from domestic stoker fires in small inexpensive settling chambers or keeping it down by suitable baffles; (2) problems arising from coal that will or will not clinker according to plan; (3) what happens to anthracite when heated to 2,700 deg. F. out of contact with air; (4) stripping pitching coal beds in the Southern Anthracite Region and mining a coal bed on the bottom of the Ohio River with a floating dredge and cleaning the coal in a barge; (5) cokes from Pacific Coast coals and (6) how to make better coke and thus produce more pig iron despite restricted blast-furnace capacity.

1. What Is Fly Ash?—About 1 percent of the total weight of coal burned in industrial underfeed stokers operating under normal loads becomes "fly ash," declared Dr. A. W. Gauger, director, Mineral Industries Experiment Station, Pennsylvania State College, speaking for T. S. Spicer, assistant professor; R. G. Bowman, former student, and C. C. Wright, professor of fuel technology, quoting a figure cited by J. F. Barkley, U. S. Bureau of Mines, and others. "Fly ash," he added, "of course, is a misnomer, as the light material that escapes from the fuel bed into the air generally is a mixture of small carbonaceous particles varying from raw coal to coke with inorganic particles ranging from fluffy ash to the dust derived from fused clinker.

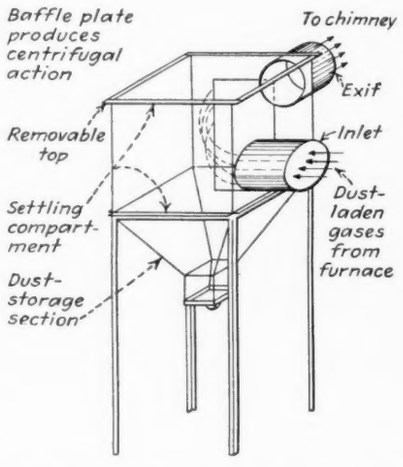
Stokers Are Dust Makers

With Stokers, More of the Ash Is Carried by the Air—Even with hand-fired furnaces some fly ash is produced, necessitating periodic cleaning of the boiler flues or furnace radiator, the smoke pipe and occasionally the chimney itself. Stokers increase the quantity of fly ash many fold, because with them air travels through the fuel bed at a higher velocity than with hand-fed furnaces. In some cases, to remove flue ash, the furnace must be partially dismantled.

A Bushel a Week—Observations made on a variety of domestic-stoker installations for burning coals of clinkering type that have an ash that is little disposed to clinker show that they may make a bushel of fly ash a week. Even during normal operation, the dry ash tends to accumulate on the hearth, especially during operation in mild weather, when, because of low fuel-bed temperatures, an excessive quantity of fly ash may be produced, permitting a portion to be picked up by the flue gases. From field observations, it appears that the fly ash which clinkering and ash-removal types of stokers may produce is not far different in quantity, though in the two instances the dust may come from a different source. When burning slack coals in a State College home, fly ash constituted from 0.6 to 1.2 percent of the coal burned, but when using sized coals, this quantity may be reduced materially, provided the stoker feed worm does not crush the feed. If stoker coal of a top size of 1 to 1¼ in. is used, the quantity of fly ash is not appreciably increased by any size degradation that may occur before the coal reaches the combustion zone.

An average home in the heating season consumes 10 tons of slack; therefore the volume of fly ash would vary from 8 to 16 cu.ft. and, with specially sized coal that will produce the minimum of fly ash, over 4 cu.ft. of the dust will be distributed. Whether deposited in the flue or chimney or discharged from the stack, this dust will constitute a definite nuisance.

How Best to Collect Fly Ash—Fly-ash emission from domestic stoker furnaces can be reduced by dust collectors, which



Phantom drawing of chamber to settle the fly ash from a domestic stoker.

for domestic use should be simple in construction and operation, compact, heat-resisting, inexpensive, and of such design as not to impede excessively the flow of gases; so a settling chamber such as shown in phantom view above was constructed. Here settling, impingement and centrifugal effects are combined.

Settling Chamber Involves Little Cost, Heat or Inconvenience—Each of the units installed in the test homes cost about $12. With mass production, this expenditure could be materially reduced. Installation cost should be low. Little heat is radiated from the exterior walls of the settling chamber even during summer operation if the stoker is being used then only to heat domestic service hot water. In fact, in the winter the settling chamber conserves heat that otherwise normally would be discharged up the chimney. Home owners seem willing to install such flue-dust collectors and to service them when installed.

Installation of a baffle reduces the fly-ash emission from the firebox almost 50 percent, but still the quantity produced constitutes a definite nuisance. Such firebox baffles can be used only with a relatively free-burning fuel, as with anthracite, a few of the freer-burning bituminous coals or coal being burned in stokers with some method of coke-tree control. The baffle is not well suited for use with the clinkering type of stoker, because to be effective it must be so located in the furnace as not to interfere with the removal of clinker.

What Influences Quantity of Fly Ash—Fly-ash emission is more serious with bituminous coal than with anthracite, declared Ray Johnson, industrial fellow, Mellon Institute. After coke trees have formed, asserted Dr. Gauger, more fly ash is produced. Anthracite fly ash consists more of coal than of inorganic particles, said H. J. Rose, senior industrial fellow, Mellon Institute. Anthracite makes no light cenospheres or other bloated material. Presence of clinker may increase the emission of fly ash by increasing the speed with which the air travels through other parts of the fuel bed, remarked Allen Johnson, secretary, Technical Advisory Board, Anthracite Industries, Inc. As the fly ash is dry, the settling chamber is not corroded, concluded Dr. Gauger.

2. Clinker or Dry-Ash Removal—Refuse is removed from domestic stokers by two basically different methods—automatic dry-ash discharge and manual removal as clinker—asserted Dr. Gauger, speaking for Drs. Spicer and Wright. Formation of clinker is important in both methods, but for diametrically different reasons. Clinker interferes with the mechanical device that automatically effects dry-ash removal, but, with manual clinker removal, lack of clinker formation will cause a variety of trouble.

Exponents of automatic dry-ash removal assert that such equipment suits a much wider range of bituminous coals than with manual clinker removal, but, though

TABLE I—QUANTITY AND QUALITY OF FLY ASH RESULTING FROM COMBUSTION OF BITUMINOUS COAL IN AN UNDERFEED DOMESTIC STOKER

Coal Source Seam	Coal Size, In.	Fly Ash: Percent Ash in Coal as Received	Fly Ash: Pounds Per 100 lb. of Coal Burned	Fly Ash: Percentage Inorganic Ash
Fulton-Barnett	1 x 0	6.6	0.9	27.4
Fulton-Barnett	⅜ x 0	7.7	1.2	25.2
Pittsourgh	⅜ x 10m.	7.8	0.3	58.0
Upper Kittanning	¾ x 0	8.0	0.6	35.5
Lower Kittanning	¾ x ⅜	6.6	0.5	49.7
Lower Kittanning	¾ x 0	7.3	1.0	37.8

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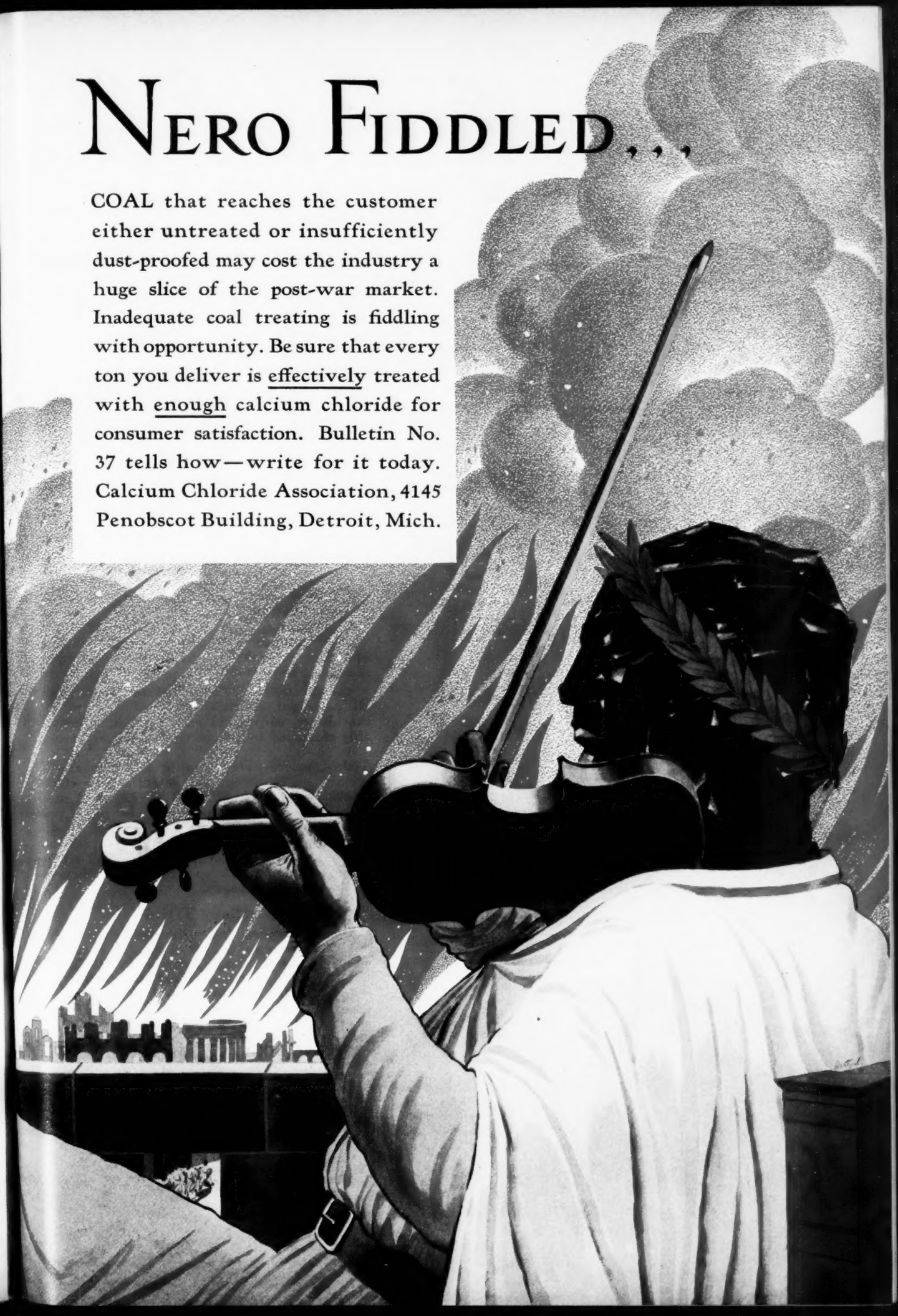

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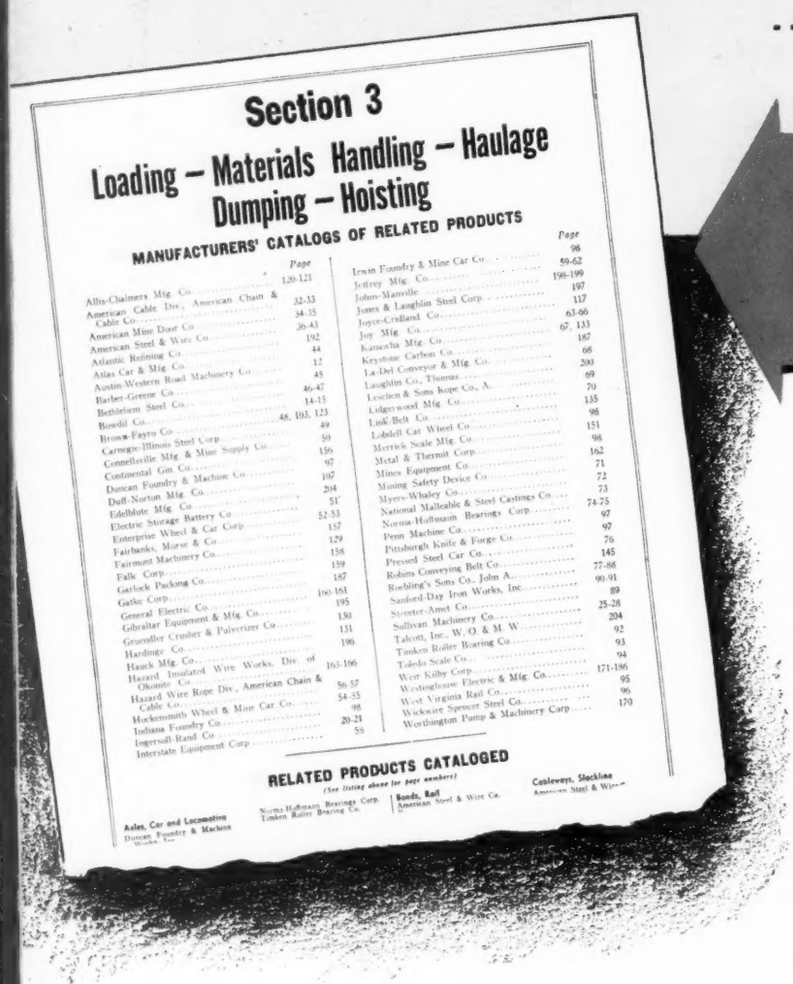

Section 3

Loading – Materials Handling – Haulage
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Bureau of Mines Approvals

Three approvals of permissible equipment were issued by the U. S. Bureau of Mines in January, as follows:

Northwestern Improvement Co.—Universal type coal drill; 220 volts, a.c.; Approval 468; Jan. 11.

Goodman Mfg. Co.—Type 1224-CJ cutting machine; two motors, 35 and 50 hp., 500 volts, d.c.; Approval 469-A; Jan. 11.

Jeffrey Mfg. Co.—Class 34 distribution box, three branch circuits; 220 volts, a.c.; Approval 470; Jan. 26.

broadly this is true, most of the technical data substantiating their assertions are based on experience with industrial stokers where load conditions permit relatively high combustion rates. Obviously fallacious, if all facts are considered, is the application of these data bodily to domestic stokers, because a substantial part of the operation, especially during fall and spring, is at relatively low combustion rates.

Too Fluid or Not Fluid Enough—Certain coals with a too-fluid ash under normal operational conditions cannot be used with the clinkering type of stoker, because the fused ash fouls the tuyeres. Other coals fail because, under normal conditions, the ash is too refractory to clinker properly. Even coals regarded as satisfactory for stoker use frequently fail to produce a good clinker when, because of mild weather, low combustion rates are maintained. This is especially true when the stoker is being operated for domestic hot-water service. Long-handled scoops have been purchased for removal of dry unfused ash, and chemicals have been sold to cause the coal to clinker more satisfactorily.

Operating Conditions More Significant Than Coal Characteristics—No apparent correlation seemed to exist between clinker formed, percent of ash in coal, ash in refuse and A.S.T.M. fusibility data for several coals studied in the laboratory tests when equipment and operating conditions were as nearly identical as could be obtained. Similar plots for home-test data showed even less correlation, but this result hardly is surprising when the wide variations in percentage of "on" time, length of such time, heat-demand cycles and the burning of garbage are considered. These results indicate that as criteria of clinker formation in the domestic ash-removal stoker ash-fusibility data are in themselves without significance.

In laboratory tests, and still more in home tests, percentage of clinker bore no semblance of relationship to percentage of ash in coal. Unquestionably, coking, matting and swelling of the coal and the burning properties of the coke produced have a definite influence on the character of the fuel bed, and this in turn influences the formation of clinker. As in industrial use, matting or so-called caking increases intensity of combustion on the underside

and around the edge of the caked mass and reflects heat downward into the grate and tuyeres. As a result, in domestic stokers such matting slags tuyeres and forms a clinker that will resist removal. Channeling due to coke trees gives intense combustion in localized areas, causing clinkering and also low rates of combustion and no clinkers in others.

Clinker formation in the ash-removal stoker is not as great an inconvenience as is the removal of dry ash from a stoker of clinkering type, and clinker has to be removed only a few times during a heating season. Mild firing periods favor dry-ash removal whereas heavy firing periods induce clinker formation.

2. *Are Metallurgists in Error?*—Observations and records covering 180 separate chargings of a 36-in. gray-iron foundry cupola using egg anthracite as fuel appear to have laid wide open to question many pet theories of metallurgists, declared J. F. K. Brown, assistant general manager for engineering, Hudson Coal Co., speaking for himself and F. E. Roecker, of the same company. In this study, 3,000,000 lb. of metal has been cast and over 300,000 lb. of coal consumed. Because its porosity is thought to provide more square inches of carbon to come in contact with a stream of air than is possible when anthracite with its smooth surface is used, coke has been regarded as the ideal fuel for casting.

Are Coke Pores Assets?

Iron Men Want a Fuel Full of Pores—Mr. Brown quoted from "The Fundamental Aspects of Combustion," Fuel Conference, London, 1928, by Prof. W. A. Bone and others to the effect that "it seems probable that when air comes in contact with incandescent carbon, as in a coke fire, the sequence of events is: (1) a "fixation" of oxygen at the carbon surface, (2) the simultaneous evolution therefrom of oxides of carbon, and (3) the rapid attainment and adjustment of a mobile equilibrium in the reversible system $2CO = C + CO_2$. Mr. Brown also presented statements of other authorities confirming his statement that metallurgists, in general, supported this combustion concept that a gas film surrounds the solid carbon.

But Is the Fuel Enveloped in Gas?—Every one of the egg-size pieces of fuel tends to be shielded in a degree from the action of oxygen, for the cupola develops a bed of ash near the tuyere level, so the fuel has ash on its underside and, streaming over its top and sides is an intermittent downward flow of slag and molten metal so that the gases as they try to rise meet much resistance.

The voids alternately are opened by the movement and combustion of the fuel, cleared by the cleansing flow of iron, slag and air, and again closed by a further movement of the material in the cupola. That such a closing and opening of the voids occurs in the fuel beds is evident at the tuyeres, where a stream of molten iron can be seen falling, only to be shut off and replaced by another to right, left, or behind, beginning in separate drops, followed by a continuous pour, until that, in turn, is shut off.

Air Grazes Only the High Spots—

Quoting Perrott and Kinney, Proceedings, A.I.M.E., 1923, p. 547, Mr. Brown stated: "Combustibility of coke does not increase with decreasing apparent density or [what is the same] with increasing porosity. The total effective surface is probably independent of the number and size of the pores, over the range of porosity in ordinary metallurgical coke, because the voids between the separate coke pieces are so large in comparison to the size of the pores, and [because, moreover] the velocity of the blast passing in and out of the pore depressions or passing through the coke pieces by way of connected air is infinitesimal." P. H. Royster confirmed this with the statement that "a porous coke might be expected to be less combustible than a dense coke because combustion . . . probably takes place on the exposed peaks of the cell walls."

How the Cupola Is Charged—In charging the space up to and, for a distance, above the tuyeres, to be discussed later, the fuel is fed without any admixture of metal. Following this, alternate layers of metal and fuel are introduced. A natural draft of 100 c.f.m. is passed through the coal for about 90 minutes, raising the heat at the tuyere level to temperatures ranging from 1,650 to 2,600 deg. F. At the end of that time, a blast of air is applied for a further 10 minutes. Thereafter the iron melts and immerses the coal lying below the tuyeres in a bath of liquid metal at a temperature of about 2,700 deg. F., which is maintained for 2½ hours. Into this bath no air can enter, so the coal is coked or cooked.

Anthracite Before and After—As shoveled into the charging door of a cupola, anthracite is black and shiny, but, on being cooked in the absence of air at the high temperature of melting iron, it becomes a dark gray with sometimes a silver-gray surface or edging. The egg-sized lumps of coal, picked out of the mixture of metal and iron, when dropped out of the bottom of the cupola at the end of the run, are found to be etched along the laminations of the coal to depths greater than those of the cells in coke. Along the other faces the coal is seamed with cracks and crevices that in places penetrate almost through the lumps. Though such pieces split readily, they are extremely hard across the grain. In the laminations, a thin layer of black tarlike material sometimes appears.

Cooking Betters Anthracite

Cooked Anthracite in Cupola—S. A. Skomorochov, in Russia, operated a cupola on the unbroken anthracite remaining after the coal had been slowly and uniformly heated from 18 to 19 hours up to 1,100 deg. C. This lowered the sulphur content from 2.5 to 0.8 and 1.2 percent and also devolatilized the coal. As a result, fuel requirements were reduced from 13.5 percent to 9 percent and CaO from 4.2 to 2.7 percent. Gas issuing from the throat of the furnace was lowered in temperature from 450 to 220 deg. C. and bath temperatures also, thus improving the properties of the metal; the carbon-dioxide content of the products of combustion, the thermal coefficient and the furnace output also were increased, the

last up to 40 percent, without increase in air or pressure requirements or wear on lining.

At the Hudson Coal Co.'s shop in Providence, Pa., carbonized anthracite, picked from the material dropped from the cupola at the end of a run, was used as the bed fuel in a regular cupola operation for the melting of 12,000 lb. of castings. Its use slowed ignition and combustion propagation, and reduced flame materially. The test proved also the ability of anthracite to withstand the shock of being charged a second time, despite the ready fracture of the material along laminated planes. In charging the cupola, 1,000 lb. of metal is dropped 8 ft. on top of the coal when visibly hot (1000 deg. F.). The cupola usually is run without flux and at the start of a run fused ash may clog one or more tuyeres, but this did not occur when the carbonized anthracite was used. The metal obtained has a tensile strength of 32,500 lb. per square inch, which is more than normal.

Much Heat in Little Space

Fuel Occupies Smaller Volume—At Providence, the cupola is charged with bed anthracite to a level about 20 to 22 in. above the tuyeres, but with coke the loading must be 16 to 18 in. deeper. Coke weighs 29 and anthracite 53 lb. per cubic foot. About 1918, when coke was scarce and anthracite was used in its place in the Providence cupola, just as many shovelfuls of anthracite for bed fuel were fed to the cupola as had been used when coke was the operating fuel.

Cut Time in Half—In consequence, a heat that can now be made with anthracite in 3½ hours took that much longer, and the temperature was below normal. In operating the cupola with anthracite, recognized practice now is reversed—the charging door is closed while the cupola stands under load and tuyeres are left open. This has been done despite warnings at first that the bed would be burned and that the metal would be cold. After closing the charging door, operating time was decreased, the reduction in time occurring entirely in that part of the operation prior to arrival of metal over spout.

For anthracite, the bed thickness above the tuyeres was reduced by stages from 20 in. or more to 7 in., decreasing thereby the time required for the first metal to reach the spout but giving worse operating conditions. Apparently, bed height had to be maintained somehow, or opportunity for the requisite combustion reactions would not be provided.

Firebrick Replaces Some of Coal—In consequence, 250 to 300 lb. of firebrick was added, (1) mixed in equal proportions with anthracite and the whole placed in the same position as before, (2) placed in the same quantity but as a separate layer, or (3) placed as a lining around the inner circumference of the cupola, but in this instance only 100 lb. of brick was used. This increased the temperature of the metal at the spout. Thermal shock and depreciation therefrom, asserted Mr. Brown, are, despite contrary opinion, the means whereby anthracite is made effective as a fuel for melting iron. They are desirable characteristics of anthracite.

4. *Phenomenal Growth of Anthracite Stripping*—In the decade from 1932 to 1942, the production of anthracite by stripping increased from 3½ million tons, or 7 percent of total output, to twice that quantity, or over 14 percent of total production. Some operations in the Southern and Middle Western fields obtain more than 30 percent of their production from this source, stated O. W. Shimer, mining engineer, Hudson Coal Co., for himself; D. C. Helms, mining engineer, Lehigh Navigation Coal Co., and C. E. Brown, division engineer, Philadelphia & Reading Coal & Iron Co. Though it usually is necessary to load the entire overburden into trucks and haul it out of the pit to the dump, such material is backfilled and cast whenever possible.

Drilling—With both electric- and diesel-driven drilling equipment, drillholes for blasting rock cover trend definitely to increase in diameter from 6 to 9 in., as in some strippings extremely hard sandstone and conglomerate occur, some of which is 40 to 50 ft. thick. The greater weight of the stem of the 9-in. drill permits a hole to be driven from 30 to 40 percent faster than with a 6-in. drill, and the holes, receiving a heavier charge, can be placed farther apart. Thus 30 to 40 percent more rock is shattered for the same number and length of holes. After introducing these greater diameters, most contractors started to "deck load their holes"; concentrating, that is, the charge of powder in the hardest rock or at the point of greatest resistance, thus obtaining maximum fragmentation.

Stripping Vertical Beds

Excavating—Where the coal bed is vertical, the overburden is comparatively light and consists of clay and gravel. In this case, space for spoil can be found on either side of the pit within reach of a dragline with a 2- to 4-cu.yd. bucket and a 60-to 80-ft. boom, which lifts both cover and coal. The depth to which the coal can be removed depends on the reach of the dragline or on the length of time the rock walls will stand.

Where the coal bed pitches 55 to 90 deg. and has a hard rock cover, draglines are used with 5- to 9-cu.yd. buckets and with booms up to 200 ft. long, generally of the Monighan, or walking, type, powered with either diesel oil or electricity. With lower pitches, as the shovel then can be lowered into the pit, the overburden is removed with draglines and the coal is loaded by power shovels.

However, when the economic limit for stripping has been reached, more coal can be removed by starting at the inner end of the pit and lifting on retreat with a small dragline a triangular cross-section of coal. The more the coal pitches, the deeper can this final cut be made.

Transportation—The largest trucks now in service are 12-cu.yd. end-dump Euclids and 9- and 11-cu.yd. Stirling and Mack trucks and in one location 21-cu.yd. Mack trucks were recently added. Most of these have diesel motors. Mr. Shimer said that no trailer or semi-trailer trucks could be used in any of the strippings covered by his remarks, as the pits were

too narrow for turning such equipment. The trend is toward an increase in the capacity of the present type of truck which has dual rear tires, the durability of which manufacturers are increasing steadily.

Rough Cleaning—Areas first-mined and later caved or partially depillared and other areas irregularly mined by bootleggers yield coal more or less mixed with refuse, and large equipment loads much of this with the coal, so it is preferable to give this coal a rough cleaning as near the stripping as possible.

In these plants, all the material is passed over a bull shaker, where minus 6-in. material is bypassed directly to the railroad car, and the plus 6-in. is passed over a picking table, where all rock and refuse are removed, dropped into a rock pocket and later hauled by truck to a refuse dump. The material which goes over the end of the picking table passes through a set of large-size rolls before it reaches the railroad car.

Already River-Stripped

Dredging Coal Seam From River Depths—Underneath the Ohio River between Moundsville and Powhatan Point, both in Ohio, the 8-ft. Pittsburgh No. 8 seam lies either uncovered except by water or at dredgable depths, declared Everett Drennan, vice president, River Coal Co. The coal rises in general only 9 in. in every 100 ft.

Thirty-three diamond-drill holes were sunk between Bellaire, where the coal crops on the river bank, and Powhatan. Sixteen proved the presence of coal having almost uniform thickness with identical binders and analyses. It is believed that coal can be recovered with the equipment available so long as the depth of the bottom of the coal does not exceed 35 ft. at pool stage. The provings show that about 2,000,000 tons of coal is available within that depth.

Trenching Layout—Operations were begun 300 ft. below the pipeline of the Hope Natural Gas Co., at Pipe Creek, where the coal seam was covered only by water. A "starting trench" was made from the Ohio shore across the stream and parallel to the pipe line for 400 ft. For fear of collision with tows making the bend of the river, the first downstream Cut No. 1 from the starting trench was made at a point 200 ft. from the Ohio shore and is to be extended 4,000 ft. to the dredging limit, meeting with overburden 1,000 ft. from the starting trench.

It is now 1,100 ft. from the starting trench, and 2 ft. of overburden has appeared, but as the water is deep and the quantity of material to be cast inconsiderable, it is not being put into scows but laid over what will be the next inshore cut, where, when Cut 2 is stripped, it will be picked up and deposited in the trench of Cut 1. It was explained later that the pooling of the stream would protect the trench against sedimentation.

Digs Coal Without Preliminary Shooting—A dipper dredge is used with a 2½-cu.yd. bucket strongly reinforced with manganese-steel ribs and lip and equipped

with manganese-steel chisel teeth. The length of the dipper stick permits digging to a depth of 29 ft. below the water surface when the dredge is raised on its two front spuds of 27x27-in. steel-incased timber 49 ft. long. This dredge has dug 25,000 tons of coal without aid from explosives. Hour-long records indicate a dredging capacity of 140 tons per hour.

Another Barge Acts as Preparation Unit—The tipple boat has about the same displacement as the dredge, 120 ft. long by 34 ft. wide. A 150-hp. Scotch marine boiler and a 150-hp. side-crank engine, direct-connected to a 100-kw. alternator, is mounted in the starboard bow of the hull. A Jeffrey jig washer is set in the center of the hull, leaving space for crusher and elevators if desired. Regional prices for deep-mined coal have been set by Bituminous Coal Division.

Fifty Tons per Employee—On its single shift, the dredge has an operative, a dipper tender, a fireman and a night watchman. On the tipple boat are a superintendent of operation, a chief mechanic, a night mechanic, outside bin man, a fireman, two slate pickers and a deck hand. Thus the crew consists of twelve men, who, producing 600 tons daily, deliver 50 tons per employee.

Turkey's Coal Resources—In a paper presented by Dr. T. T. Read, Vinton professor of mining engineering, Columbia University, for Ferit Gurses, a graduate student, Turkey has four principal coal basins, located (1) in the Eregli-Zonguldak basin on the Black Sea, 2,000,000,000 tons perhaps in all with volatile 26 to 32 percent, moisture 2 to 8, sulphur 0.3 to 1, B.t.u. 12,240 to 13,500; a Carboniferous coal; (2) Tchanak basin (Dardanelles), (3) Thrace basin, and (4) Erzurum basin, lignite with volatile 21.6 percent, moisture 43 and ash 15. All mines are operated by the government. Tons per man-shift at face is 2.297, all employees only 1.020, though operating conditions are not unfavorable.

Phosphorus Persistent

5. *Where Phosphorus Is Found*—Occurrence of phosphorus in the coal of Washington State and its removal were discussed by M. R. Geer, junior mining engineer, U. S. Bureau of Mines, for himself; F. T. Davis and H. F. Yancey, supervising engineer, also of the U. S. Bureau of Mines. Dr. Geer stated that for some reason none of the phosphorus in the coal was removed by the coking process and that in consequence the coke contained a percentage of phosphorus larger than that of the coal from which it was made, in inverse proportion to the percentage coke yield. Dr. H. H. Lowry thought it strange that some did not leave as phosphine (PH_3) or phosphorus.

Asked by Dr. Gilbert H. Cady, senior geologist, State of Illinois, whether studies had been made to correlate phosphorus occurrences to the banded constituents of the coal, Dr. Geer replied that he had not done so. In Europe, such studies had been made, and fusain had been found to have more than its share of phosphorus. Being fine, it could be screened out of the coal, thus reducing the phosphorus content.

In studies of the Pittsburgh Coal Co., most of the phosphorus was found in the plus 2-in. coal, where 0.090 percent was present, declared D. H. Davis, chief chemist, Pittsburgh Coal Co. The minus 2-in coal had 0.018 percent and the mine-run coal ran 0.027 percent. It is the breast coal of the Pittsburgh bed that makes most of the lump and therefore evidently contains most of the phosphorus. The highest percentage, however, was found in a thin layer immediately over the clay bottom. In Washington State, the distribution of phosphorus in coal and coke appeared quite fortuitous, declared Dr. Joseph Daniels, professor, mining engineering and metallurgy, University of Washington.

Coke Making Dates Back 60 Years—A record of coke making in Washington State extending over nearly 60 years has demonstrated the availability and suitability of its coals, particularly those from Pierce and Kittitas counties, for the manufacture of satisfactory coke for most of the purposes for which that material is used, declared Dr. Daniels, presenting a paper by himself and Dr. Yancey. Other localities have important future reserves.

Too High Ash? Add Carbon

Blend With Petroleum Carbon or Coke—The high ash contents inherent in many of them may be modified by improved washing methods and by blending them with low-ash non-coking coals, petroleum carbon and petroleum coke. In many of the coals, phosphorus is perhaps higher than is desirable for some uses, but blending, especially with low-phosphorus petroleum carbon, has improved the analysis of the coke.

In the past these coals have been coked successfully in beehive, byproduct and bench ovens and the cokes have been widely used on the Pacific Coast, but changes in metallurgical practice and competition with foreign cokes, brought into the market territory as ship ballast, have contributed largely to the decline of the industry. Present demands indicate that the Pacific Northwest must have coking plants independent of outside sources as base supplies for the varied industries now locating near hydroelectric power lines.

Better Coke Will Increase Pig-Iron Output—Shortage of steel for the many war needs, lack of steel scrap, need for blast furnaces to make pig iron and lack of material for such construction make imperative the maintenance of pig-iron output at a maximum, declared L. D. Schmidt, chemist, U. S. Bureau of Mines, for himself; W. C. Schroeder, assistant chief, and A. C. Fieldner, chief, Fuels and Explosives Service, U. S. Bureau of Mines, respectively.

Unknown Analysis, Uncertain Results—In a degree, uniformity in coke is more important than ash content in the maintenance of coke output. If ash is to run up to 15 percent, it is better to have the ash run evenly at this upper limit than to have it vary uncertainly, now 10 and again 15 percent, for, as Dr. Lowry afterward stated, the pig-iron chemist needs to know what chemicals he has in his mix and often he does not know

until the run is completed. One blast-furnace company, declared Dr. Schmidt, is receiving coal from 18 different mines! One percent increase in ash makes a 5 percent decrease in the production of iron. Accordingly, more coal-cleaning plants are needed to assure the required uniformity.

Need for Coal Reserves—Also more coal should be stocked. It should be piled first in small cones, and then other piles should be dropped on the slopes of these first piles. But coals lose their coking quality with exposure. With the time that Pittsburgh coal from Allegheny, Pa., will retain a certain percentage of its coking power being equated arbitrarily to unity, Table II shows the retentive power of several other coals.

Steps in Coal Carbonization—As coal is heated from room temperature, the first change evident is evolution of water, which begins around 100 deg. C. and continues as the coal is heated to higher temperatures, said Dr. Glenn C. Soth, assistant chemical engineer, Koppers Co., for himself and Dr. Russell. As the temperature rises above 100 deg. C., the molecules rearrange themselves and decomposition begins. At some temperature between 330 and 440 deg. C., most coking coals begin to soften. Rapid decomposition begins around 425 deg. C., producing tar and oil and permanent gases as volatile products.

With further increase in temperature, both the degree of fluidity and the rate of decomposition increase rapidly. The fused coal generally exhibits its maximum fluidity in the temperature range 440 to 480 deg. C. and the fluidity usually decreases rapidly with any further increase in temperature until the material hardens to semi-coke around 500 deg. C.

Evolution of volatile products usually is at a maximum also in the temperature range 400 to 480 deg. C. and then decreases. Evolution of condensible volatile products generally ceases around 500 deg. C., but the production of fixed gases continues. As the semi-coke is heated to temperatures above 500 deg. C., the principal change occurring is further decomposition of the semi-coke with evolution of carbon monoxide, hydrogen, and some elementary hydrocarbons such as methane (CH_4) and ethylene (C_2H_4).

Gieseler's Plan for Measuring Fluidity—The modified Gieseler plastometer has been found satisfactory for all coals tested. It is designed so that a sample of fine coal in a retort can be so tightly packed around a stirring shaft that the shaft will be unable to turn until the coal softens. The stirrer has four rabble arms of 1 7/16 in. diameter and ¼ in. long placed at intervals of 90 deg. around the stirrer shaft and ⅛ in. apart vertically from center to center, the lower arm being 1/16 in. above the crucible bottom when the apparatus is assembled.

At the upper end of the stirrer shaft is a pulley with a cord by which it and the stirrer shaft are revolved, this cord passing over another pulley connected to the pointers of a dial. On the end of the cord is a 40-g. weight, and it is its descent that pulls the cord and revolves the pointer pulley and the stirrer. The sample is minus 20-mesh coal ground to minus 35-mesh with a mortar and pestle. An electrically heated unit containing "half-and-half" solder as a bath medium is used for heating the sample.

TABLE II—RETENTIVITY OF COKING POWER OF SEVERAL COALS

Bed	Locality	Relative Retentivity	Bed	Locality	Relative Retentivity
Bevier	Cherokee, Kan.	1.54	Sewell	Wyoming, W. Va.	0.77
Lower Freeport	Indiana, Pa.	1.1	Bakerstown	Tucker, W. Va.	0.72
Pittsburgh	Allegheny, Pa.	1.0	Pocahontas No. 3	Wyoming, W. Va.	0.48
Taggart	Harlan, Ky.	1.0	Pocahontas No. 4	Raleigh, W. Va.	0.25
Upper Freeport	Monongalia, W. Va.	0.93	McAlester	Pittsburg, Okla.	0.18
Thick Freeport	Allegheny, Pa.	0.93	High Splint	Harlan, Ky.	0.18
Lower Banner	Buchanan, Va.	0.82	Henryetta	Okmulgee, Okla.	0.10
Pond Creek	Pike, Ky.	0.81			

Maximum Bituminous Coal Prices Raised; No Action on Coal-Act Extension

WHILE indications increased that there would be no early action on the extension of the Bituminous Coal Act of 1937, a number of increases in maximum-price schedules were announced by OPA in February. Meanwhile, District Board No. 3, joined by Nos. 1, 2, 4 and 6, asked the Bituminous Coal Division to put off hearings in Docket A-1737 (revision in minimum prices requested by Districts 7 and 8) from Feb. 24 until after the new wage agreements are signed. Acceding, the Division set March 24 as the date.

Beginning Jan. 30, maximum price increases to take care of overtime payments and other increases in costs had been granted by OPA in 14 of the 22 bituminous producing districts up to Feb. 20. These districts were: No. 1 (central Pennsylvania, eastern West Virginia Panhandle and Maryland), 23c., effective Feb. 4; No. 2 (western Pennsylvania), 23c., Jan. 30; No. 3 (northern West Virginia), 19c., Feb. 4; No. 4 (Ohio), 18c., Feb. 4; No. 6 (northern West Virginia Panhandle), 19c., Feb. 4; No. 7 (southern West Virginia, eastern Kentucky, Virginia), 23c., Feb. 13; No. 8 (southern West Virginia, eastern Kentucky, Virginia, northern Tennessee, North Carolina), 21c., Feb. 13; No. 9 (western Kentucky), 13.6c., Feb. 20; No. 10 (Illinois), 12.4c., Feb. 20; No. 14 (Arkansas-Oklahoma), 20c., Feb. 6; No. 18 (Arizona-California-New Mexico), 55c., Feb. 12; No. 20 (Utah), 21c., Feb. 6; No. 22 (Montana), 15c., Feb. 3; No. 23 (Oregon-Washington), 50c., Feb. 3.

With the April 25 expiration date getting closer, little action was taken on bills to extend and amend the Bituminous Coal Act. Principal stumbling block was the inability of the House Ways and Means Committee, with other major legislation before it, to give active consideration to the matter, let alone hold hearings. The committee's chairman, Representative Doughton, introduced the bill supported by the Bituminous Coal Division and other government officials Jan. 22 (February Coal Age, p. 128). The Lewis-Jenkins bill, providing, among other things, for a return to a coal commission, is supported by the United Mine Workers.

Meantime, advocates of the Doughton bill began a campaign to enlist support. These advocates include the Coal Producers' Committee, which mailed out a letter and petition Jan. 29, the latter, favoring the Doughton proposal, to be signed and returned. Signers of the letter included 171 coal companies throughout the United States and one association, the Western Pennsylvania Coal Operators' Association.

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Wooton Named as President Of White House Scribes

The White House Correspondents' Association has elected Paul Wooton, Washington correspondent of *Coal Age* and other McGraw-Hill Publications, as its president. Mr. Wooton has served the organization for several years as its secretary and treasurer. In that position he has handled the business side of the association's affairs. Since the business affairs of the association increased in volume until it became necessary to transfer them outside of the White House, Mr. Wooton's office has become a sort of clearing house for various activities of the press in Washington. When the association was organized, Feb. 25, 1914, its members numbered less than 100. Now the membership exceeds 500.

Paul Wooton

War Angle in Coal Mining Stressed At Beckley Electrical Meeting

How the Power Industry Has Geared Itself to Serve Coal Mining—Saving Electrical Materials and Avoiding Equipment Failures in Mines—Storage-Battery Power for Loading Machines—D.C. Power Distribution Under War Conditions—The Materials Situation

METHODS of saving materials and equipment, reducing power consumption, promoting higher efficiency and effecting concentration for the job at hand were basic themes in the four coal mining electrical papers at a late afternoon meeting and in speeches at a night session of a joint meeting of the New River and Winding Gulf Electrical and Mechanical Institute and the West Virginia Section, American Institute of Electrical Engineers, held Feb. 11 at Beckley, W. Va. The program was designed so that most of the men from the local coal fields could get in a large part of a day's work at the mines before leaving for the meeting.

Evening speakers were D. L. McElroy, Mining Equipment Division, WPB; Captain Melvin L. Payne, from the office of Robert Patterson, Under Secretary of War; Captain Joseph T. Hall; and Major Donald L. Buchanan. L. Ebersole Gaines, president, New River Co., presided, and the talks were broadcast over the local station, WJLS. At the afternoon technical session, C. C. Ballard, institute president and master mechanic, New River Co., introduced Roy C. Hoffman, secretary, West Virginia Section of the American Institute of Electrical Engineers, who presided in place of E. D. Knight, chairman of the section and president of the Virginian Electric Co., unable to attend. At least 75 attended the technical session and over 200 attended the dinner and meeting following it.

New Plants Under Way

The Appalachian Electric Power Co. expects to complete in December, 1943, installation of a pulverized-coal steam-generating unit at Glen Lyn, Va., capable of carrying a 110,000-kva. load and has already completed the first section of an 85,000-kw. unit of the same type at its Cabin Creek plant, declared L. W. Bates, Bluefield, W. Va., in discussing the operating problems of a power company in supplying coal mines during the present emergency. Both of the new units will operate at 1,300 lb. steam pressure and 950 deg. F.

Power companies recognize that continuity of service to coal mines is more important than ever before. Although power supply and coal mining have not been classified strictly as war industries, their services are of basic importance and their problems are mutual. In 1942, the nation gained 1,665,000 kw. of steam-plant capacity which, when utilized, will add about 9,993,000 tons to the yearly demand for coal. Sale of electricity for domestic purposes reached a new high in 1942, although the change of clocks to war time was supposed to reduce or hold down the consumption for lighting. The power industry, according to Mr. Bates, has met all war demands of the country and in the last twelve months has met also the civilian demands without curtailment or rationing.

Detailed methods of saving electrical materials and avoiding equipment failures were outlined in a blackboard-illustrated talk by George C. Barnes Jr., West Virginia Engineering Co., Williamson, W. Va. His theme was complete protection of equipment and wiring (1) from neglect or deterioration and (2) from sustained or suddenly applied loads or overvoltage resulting from machine operation, grounds, short circuits and surges.

The first calls for preventive maintenance and the pointers on that included: (a) oil rings kept running freely, proper oil level maintained or other lubricant amply and correctly applied, and use of bearing thermostats; (b) regular inspections, perhaps every 60 days, and particular attention to cleaning and keeping insulations free of oil; (c) regular cleaning service; (d) every six months inspection of air gaps with feeler gages and tests of insulation with a "Megger." One megohm was suggested as the minimum resistance allowable to ground.

Mr. Barnes called attention to the fact that not many of the coal-field substations are yet protected to the full extent against lighting and switching surges. This further protection can be secured by installing a small three-phase capacitor at the machine terminals. The lightning arrester is a safety valve draining off high voltages, but even so the arrester on a 4,000-volt line will let a steep wave front of about 2,000 volts extra "sneak" through. The capacitor tapers down that wave front and prevents a doubling back or reflection which could put 4,000 volts excess on the coil ends.

Now that mining substations are undergoing more continuous loads in the intervals between haulage peaks than with hand loading, the standard railway ratings of full load continuously, 50 percent overload for two hours and 100 percent for one minute are less applicable than formerly. Therefore many companies are installing thermal overload relays, some putting them right on the machine to raise the ambient temperature. Mr. Barnes contends, however, that as yet suitable relays are not available to provide protection in the ranges of 25 to 50 percent overload for two hours. As to protection of transformers, he said that fuses which blow at 100 percent overload generally are adequate.

Speakers' table, with Captain Payne in the center, E. Ebersole Gaines at his right and D. L. McElroy at his left.

Speakers and chairmen at the technical session (left to right): E. Woodson, L. W. Bates, O. J. Swanson, George C. Barnes Jr., C. C. Ballard and Roy C. Hoffman.

For three-phase motor protection he illustrated by blackboard diagrams that with the star connection, in which coil current equals line current, the line relays guard adequately and therefore phase-failure and current-balance relays are not necessary. It is a war duty to secure protection with as little equipment as possible. With a delta-connected motor in which coil current is 100/173 of line current, line overload relays should be kept set down to just tolerate the normal line load current or if the motor coil connections are external the relays should be connected in the coil circuits.

Mr. Barnes demonstrated by illustration that if a distribution system is to be changed from 2,300 volts three-wire to 4,000 volts four-wire with grounded neutral, the existing three current transformers will suffice by reconnecting them in "Z." In a discussion following the paper, Mr. Bates showed another connection whereby three current transformers and three relays afford protection including grounding and phase unbalancing.

Thirteen tons is the weight of a truck-mounted non-self-propelling battery large enough to drive a loading machine one shift in a wireless mine, said E. Woodson, electrical and mechanical engineer, Carter Coal Co., Coalwood, W. Va. This company operates two "100-percent wireless" mines in which the usual hazards from distribution wires and trailing cables are absent. His paper dealt with the practical experiences of operating permissible equipment. The battery when mounted on a truck with 16-in. wheels is 44 in. high. During loading it is parked in an adjoining room or breakthrough and connected to the loader by a trailing cable.

Battery operation of loaders and other face equipment adapts itself readily to rapid development and changes in mining. Another advantage is the good voltage maintained at the motor terminals. Two batteries are required for each loading machine. In this wireless mining the batteries, due to the necessity for charging and watering, are available for service about half of the time. For main-line haulage, Mr. Woodson said batteries are not well adapted and, moreover, he sees no advantage in that type of locomotive power for main-line haulages on the fresh air. Present types of batteries with molded rubber trays instead of wooden trays have eliminated the fire hazards of the earlier types.

Favors Permissible Equipment

As to the use of permissible equipment, development of which reached a peak in 1930, Mr. Woodson sees it as fully worth while from even the one standpoint of cleanliness. The fact that mining machines have been blamed for more explosions than any other type of equipment is, according to Mr. Woodson, sufficient argument for the use of permissible types.

Because it is conceivable that a runner might take a machine supposed to be permissible into a more doubtful atmosphere or working place than he would an open machine, it is highly necessary that the "permissible" machine

be maintained constantly in a true permissible condition. In the care, which resolves into two divisions: (1) preventive maintenance including lubrication and (2) repairs, considerable precision is necessary. For instance, 0.004 in. is the tolerance the Bureau of Mines allows in the closing of the flanged joints of the cases and covers of permissible equipment. Mr. Woodson advocated a thorough inspection twice a week and in addition a joint inspection by the runner and an electrician each time a unit leaves the fresh air. Reports of these joint inspections should be kept on file.

Mercury-arc rectifier substations for inside of mine operation have the highest efficiency and the highest first cost, but motor-generators are the most desirable for large mines, said O. J. Swanson, electrical engineer, United States Coal & Coke Co., Gary, W. Va., in a paper entitled "D.C. Power Distribution for Wartime Production." For 250-volt systems, which, it can be expected, State laws will some time make the standard for this country, the substation units should be in the size range of 150 to 400 kw. and be spaced 1 to 1½ miles apart. In 500-volt mines the units should be 300 to 750 kw. and the allowable spacing can be proportionately greater.

Keeping Substations Close

Whether it is practicable to keep substations installed close to the load centers will depend to a degree on the cover over the coal seam. Truck-mounted units are desirable and so are tie connections made through automatic reclosing circuit breakers. How many of these breakers should be installed on feeders will depend on a balance between their cost and the cost of any lack of continuity of operations.

Following Mr. Swanson's paper there was considerable discussion of the practicability and relative safety of a proposal to use the Edison three-wire d.c. system in a nominally 250-volt mine. Two 250-volt generators would be connected in series, two live feeders carried and the rail used as a neutral return. With loads balanced there would be no current in the neutral rail and the circuit losses would be small. Potential difference between live cables would be 500 volts, but these opposite polarity feeders presumably would be kept away from each other in different sections of the mine. The potential from any line to ground would not exceed the nominal 250 volts.

J. O. Cree, West Virginia Engineering Co., Charleston, W. Va.; P. M. Barlow, electrical engineer, State Department of Mines, Charleston; and Messrs. Barnes and Swanson took part in this three-wire discussion. It was brought out that one mine in West Virginia is using underground in a minor way this 250-500-volt connection. Also there was indicated a danger from a broken neutral in combination with an unbalanced load and the dangers from "mixing" live feeders and getting a 500-volt shock or short circuit. Mr. Barnes said that in the Williamson coal field the resistance from mine rails to ground usually is about 5 ohms, but Mr. Barlow said he had found

in some fields ground resistances as high as 30 ohms.

Speaking extemporaneously, Mr. Cree pointed to the power advantages of a.c. conveyor mining. In 1942 a complete a.c. conveyor mine producing 10,000 tons per month, using six room conveyors, six face conveyors, six mining machines and two belts with 25-hp. motors, had an average over-all power consumption of only 2.49 kw.-hr. per ton. A comparable d.c. mine used 4½ kw.-hr. per ton.

The a.c. mine requires less copper and if it operates on 220 volts the transformers must be kept within 1,200 ft. of the face. The constant speed of a.c. motors is advantageous in that when a man puts a shovel of coal onto a conveyor that coal "leaves right now," as compared to the hesitation often noted with a d.c. drive.

C. O. Gallaher, in charge of electrical equipment and maintenance, Koppers mine, Stanaford, called attention to the pioneer a.c. conveyor mine which was put into operation by the West Virginia Coal & Coke Co. Corp., using a V-system at Norton, W. Va., in 1923. Mr. Gallaher was the electrical engineer on that job. Conveyor drive voltage was 220 and the 2,300-volt power was carried by pole line to boreholes spaced 2,000 ft. apart (*Coal Age*, Feb. 7, 1924, p. 197).

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To Strip at Rossiter

Coal-stripping operations were scheduled to start in the near future at Rossiter, Pa., by the coal department of the New York Central R.R. The operation will have an ultimate capacity of 1,000 tons per day, the coal going to the company's Rossiter tipple. Some 90 men will be employed.

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To Reopen Stoneycreek

Plans are being made by A. M. Wilson, W. D. Rickard and E. F. Stahl, Johnstown, Pa., to reopen the old slope of the Stonycreek Coal Co., Holsopple. The operating company will be known as the Haws Coal Co., also the name of the operating company when the mine was opened about 40 years ago. The reopening eventually will give employment to 200 to 250 men.

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Miners' Training School Opens

A vocational mining school class sponsored by the St. Clairsville (Ohio) School Board and financed from federal funds has been opened in the Reber garage building, on the Provident Road, St. Clairsville. The class is open to anyone who desires training in machinery or mechanics connected with the coal industry.

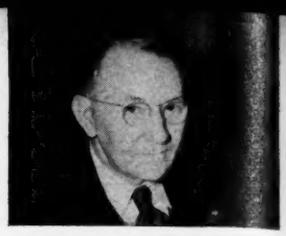
The school is designed as a war effort for training men not now sufficiently adept for jobs in modern coal mining.

This is the first school of its kind in Ohio and was urged earlier in the year by coal operators who foresaw then a scarcity of skilled labor.

Coal Men on the Job

W. G. Quillen (left), chief electrician and master mechanic, and Stephen Canonico, chief engineer, Clover Splint Coal Co.

A. E. Cole, purchasing agent, and L. H. Herrell, gen. supt., Cornett-Lewis Coal Co., Louellen, Ky.

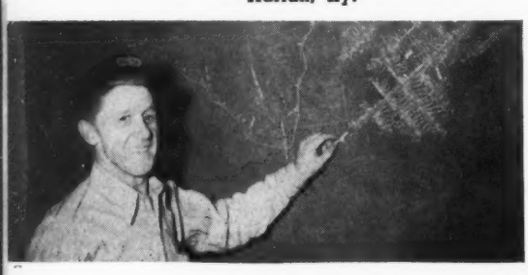


George S. Ward, secretary, Harlan County Coal Operators' Association, Harlan, Ky.

E. F. Wright (left), supt., and G. W. Young, asst. supt. and office manager, Southern Mining Co., Insull, Ky. Mr. Wright is president of the Kentucky Mining Institute.

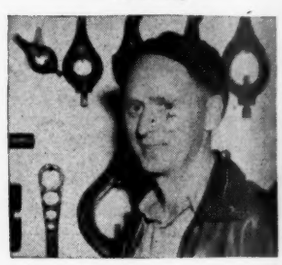
G. E. Lawless, acting supt., and J. C. Leedy, office manager, Peerless Darby Coal Co., Splint, Ky.

R. C. Collins, supt., R. C. Tway Coal Co., Harlan, Ky.



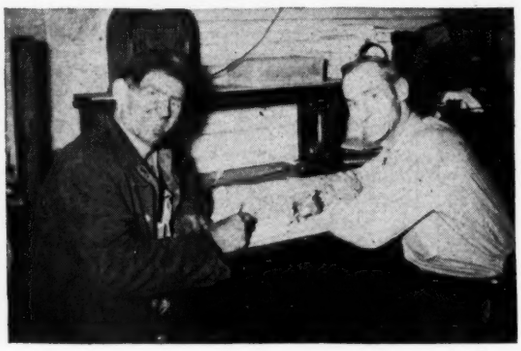
A. L. Tolliver (left), safety foreman, Crown mine, Chevrolet, Ky., and John Mayhew, supt., Blue Diamond mine, Blue Diamond, Ky.

W. R. Preston, master mechanic and manager of supplies, South-East Coal Co., Seco, Ky.



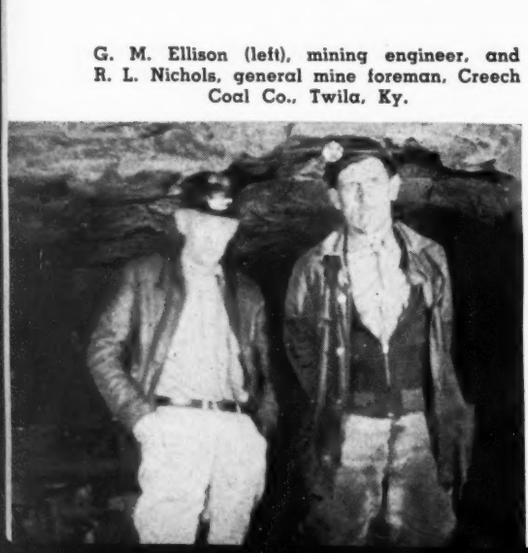
J. C. Davis (left), asst. mine foreman, and V. L. McPeek, supt., No. 31 mine, Black Mountain Coal Corp., Kenvir, Ky.

E. H. Cox (left), mine foreman, and W. A. Boy, office manager, Ridgeway-Darby Coal Co., Highsplint, Ky.

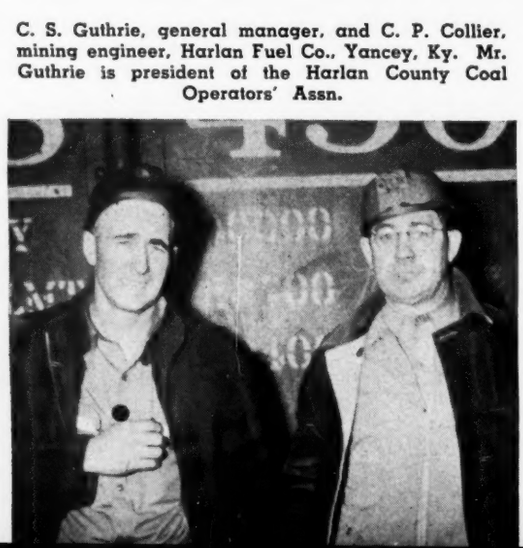


Guy Stanfill, tipple foreman, Southern Harlan Coal Co., Lenarue, Ky.

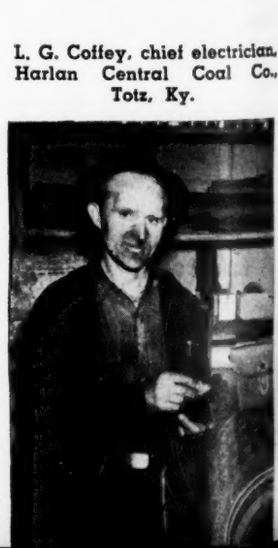
G. M. Ellison (left), mining engineer, and R. L. Nichols, general mine foreman, Creech Coal Co., Twila, Ky.



C. S. Guthrie, general manager, and C. P. Collier, mining engineer, Harlan Fuel Co., Yancey, Ky. Mr. Guthrie is president of the Harlan County Coal Operators' Assn.

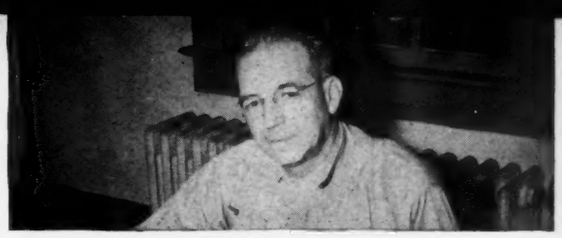


L. G. Coffey, chief electrician, Harlan Central Coal Co., Totz, Ky.



V. Bennett, president, Har- Central Coal Co., Totz, Ky.

A. R. Matthews, supt., Clover Splint Coal Co., Closplint, Ky.



George W. Creech, vice president and general manager, Creech Coal Co., Twila, Ky.

by Editors

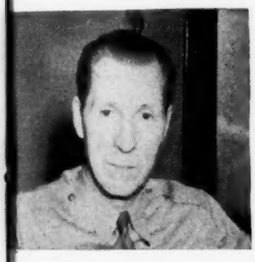
on the Job

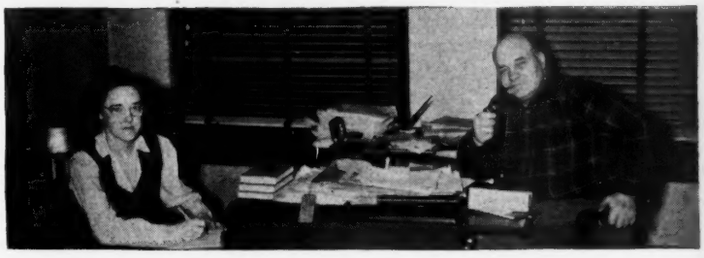
Marvin W. Ellison, supt., Southern Harlan Coal Co., Lenarue, Ky.

D. Picklesimer, gen. supt., uth-East Coal Co., Seco, Ky.

W. R. Park (left), and G. T. Powell, both of safety division, U. S. Bureau of Mines, Norton, Va. Mr. Powell is the oldest man in years and service with the U. S. Bureau.

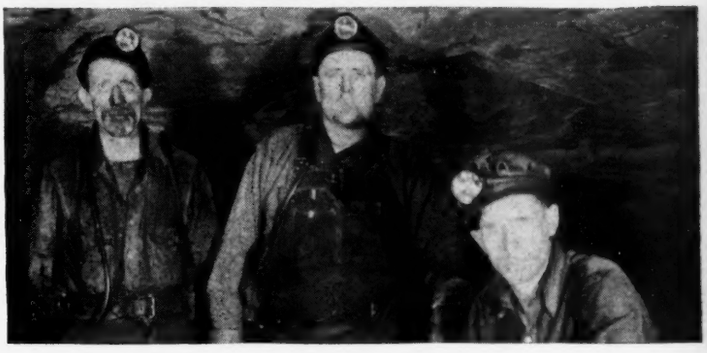
Katie Lou Lester, assistant to secretary, and Jas. F. Bryson, director of safety, Harlan County Coal Operators' Association, Harlan, Ky.





F. Mullins (left), Mining engineer; L. S. Walters, chief electrician, and E. Simpson, assistant mining engineer, Crown mine, Blue Diamond Coal Co., Chevrolet, Ky.

Walter Flynn (left), coupler; L. L. Wells, night foreman, and Ernest Payne, motorman, Croech Coal Co., Twila, Ky.



W. Dickinson (left), supt. and cashier; Jimmy Dickinson, son of esident J. A. Dickinson; Kelly Price, section foreman, Harlan mine; m Schope, general foreman, Harlan and Kellioka mines, and Charlie les, section foreman, Kellioka mine, Mahan-Ellison Coal Corp., Harlan County, Kentucky.

F. A. Watson (left), bookkeeper; J. L. Wilson, cashier; J. W. Atkins, supt., and W. Christopher, mine electrician, Perkins-Harlan Coal Co., Liggett, Ky.

Study of Mining Equipment Needs Pressed: Mines Urged to Order Promptly

ALONG WITH active consideration of the problem of furnishing coal mines with the additional equipment and materials necessary to produce the higher tonnages necessary in the future, the industry and the Mining Equipment Division of WPB proceeded actively with the task of getting requirements for the coming months outlined and orders placed. The extreme importance of maintaining mine production was stressed by H. I. Young, new head of the Minerals Bureau (see elsewhere in this news section), at a second meeting of the informal coal-mining committee with A. S. Knoizen, director, Mining Equipment Division, after which the committee went into the details of needs and methods of filling them.

Additional CMP regulations were issued Feb. 9 to complete the set-up of operating procedures for governing industrial operations under the Controlled Materials Plan. Mining operations, however, are not affected by these regulations and continue to obtain equipment, materials and supplies substantially as in the past. New PD-400 forms were prepared by the Mining Equipment Division for the use of operators holding serial numbers under P-56 in applying for second-quarter quotas. For this quarter, quotas were to be assigned in terms of weight for metals in unfabricated forms listed, and in dollar value for both operating supplies and repair parts. Orders for all new equipment and materials for expansion and new construction were continued on the basis of application to the Mining Equipment Division for approval and individual rating.

Advance purchase orders for second-quarter delivery up to 70 percent of first-quarter quotas were authorized later in the month by Curtis E. Calder, WPB Director General for Operations. This authorization applies to all mines holding serial numbers under P-56 and using Forms PD-25A and/or PD-400. But not more than 40 percent of such quantities, it was stated, "should be scheduled for delivery during April of 1943." In the case of maintenance, repair and operating materials, it was provided that quantities covered by such orders were to be deducted from quotas assigned on PD-400 forms. Second-quarter quotas, it also was announced, would apply to purchase orders placed rather than deliveries received by the mine during the quarter.

A request by the Director General of Operations that orders for "Critical Common Components" or for end items including these components, for delivery before June 30, 1943, be placed prior to Feb. 6, and for all items required in the period July 1-Dec. 31 prior to March 1, brought forth a statement from the Mining Equipment Division that mines failing to meet these dates would not be discriminated against but that the scheduling of orders would be in the order they were received from the industry.

Placing Orders Urged

The mining industry was urged to place their orders for such equipment and repair material for both the first and second halves of 1943 at the earliest possible moment. Orders for repair and maintenance parts included in the list of critical common components, it was stated, could be placed directly within the limits of quarterly quotas, using the preference ratings assigned. In the case of equipment, however, applications for ratings to the Mining Equipment Division as usual were prescribed. However, it was suggested that orders be placed immediately with a notation that an application for rating was being made simultaneously.

Included in the list of "Critical Common Components" were the following: ball and roller bearings; blowers and fans; capacitors (power and fixed types); compressors and vacuum pumps; conveying equipment; control instruments; crankshafts; electric motors, generators and starters; hydraulic parts; hand tools; gasoline and diesel engines and accessories; meters; pumps, industrial; turbo blowers and exhausters; valves and fittings; machine tools; and welding rods and electrodes.

Other priorities and materials actions taken late in January and February included exemption of all types of underground mining machinery, graders, draglines, power shovels and similar construction machinery, cars and car dumpers and sintering conveyors from the restrictions of Limitation Order L-193, issued in October, 1942. Plans also were made to restock warehouses throughout the country with rubber-covered cable to better enable mines and other consumers to obtain emergency or pressing requirements, although only limited quantities will be sold to any mine from one warehouse at a time.

The Mining Equipment Division announced establishment of a clearing house for classifying second-hand machinery and equipment available for sale. The division also solicits information from operators on second-hand equipment available. The division also announced a method of facilitating the purchase of Douglas fir and other species of soft-wood lumber covered in Orders L-218 and M-208, and asked that in case of special problems in connection with welding rods and electrodes operators communicate with the division.

The practice of grouping small mine operators under a single serial number to cut down paper work and facilitate securing equipment and repair parts by these small operators, it was announced, would be extended when such arrangements may be called for to assist the small mines in increasing production.

Electric motor controller design and manufacture were placed under restrictions in General Conservation Order L-250, issued Feb. 13. No controllers or parts may be manufactured or sold after March 1 unless orders bear a preference rating of AA-5 or higher, and manufacture is regulated to reduce material and eliminate certain auxiliaries customarily included heretofore.

Fans and blowers also were placed under restrictions both as to design and sale in Order L-280, issued Feb. 16. Sales may now be made only on orders bearing preference ratings of AA-5 or higher or approved by the Director General of Operations, WPB. None except approved orders (including those rated AA-5 or higher) may be accepted after Feb. 28 and no deliveries can be made after March 31 except on approved orders.

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Personal Notes

D. C. ABERNETHY, employed, except for a short interval, by the Hudson Coal Co. since his graduation from Pennsylvania State College in 1927, has resigned as sectional foreman at Grassy Island Shaft to enter the U. S. Geological Survey as engineer.

BEN ANDERSON ADAMS, Mayking, Ky., has been advanced to mine foreman for the Elk Horn Coal Corp. at its No. 6 mine, Jackhorn, Ky. Formerly he was connected with the Consolidation Coal Co., Jenkins, Ky.

S. E. ADAMS, formerly superintendent for nearly 20 years for the Elk Horn Coal Corp., Fleming and Haymond, Ky., has been made general mine foreman for the Elkhorn Coal Co., Kona, Ky.

A. J. ALEXANDER, formerly superintendent, No. 7 mine, Island Creek Coal Co., Holden, W. Va., has been appointed assistant general superintendent of the Carbon Fuel Co., Carbon, W. Va.

BRADLEY BALDWIN has been promoted to mine foreman for the Hi-Hat Coal Co., formerly the Payne Baker Coal Co., Fed, Ky. He was formerly connected with the Inland Steel Co., Wheelwright, Kay.

C. R. BOURLAND, formerly general superintendent of the Houston mines of the Koppers Division, Eastern Gas & Fuel Associates, has been appointed assistant to the general manager of the Lillybrook Coal Co., Beckley, W. Va.

ALPHONSE F. BROSKY has been appointed chief of the new Program Section of the Mining Equipment Division, War Production Board, being transferred from the post of chief, Solid Fuels Unit, WPB Office of Civilian Supply. The newly established Program Section has the responsibility for determining materials needed by the mining industry of the United States and other countries, and arranging allotment of such materials under the Controlled Materials Plan. The section also will program production of equipment and supplies for delivery to the mining industry as needed. The work of

the section will be closely allied with the Distribution Section and various operating sections of the Mining Equipment Division. Graduated as a mining engineer from Carnegie Institute of Technology, Mr. Brosky was for a number of years on the editorial staff of *Coal Age* and for four years was with the Jeffrey Mfg. Co., manufacturer of mining machinery.

J. C. CHILDS has been engaged as mine foreman at No. 214 mine of the Consolidation Coal Co., McRoberts, Ky. He held a similar position with the Blue Grass Coal Co., Hazard, for several years.

J. M. CLARK JR., for a number of years mining engineer with the Koppers Division, Eastern Gas & Fuel Associates, Mt. Hope, W. Va., and more recently mining engineer with the Bureau of Mines, Minerals Production Section, Mt. Hope Division, has moved his residence to Charleston, W. Va., where he has taken over the consulting engineering business of his father, the late J. M. Clark Sr. He also has been appointed secretary and treasurer of the Crab Orchard Coal & Land Co., a position his father also held. His offices are in the Kanawha Banking & Trust Co. building.

J. W. CLOSE has been made superintendent of Golden Ridge No. 6 mine of the Minds Coal Mining Corp., Elkins, W. Va., vice THOMAS G. FEAR.

WILLIAM J. DWYER has been appointed breaker foreman at Loree breaker of the Hudson Coal Co., Plymouth, Pa.

HAROLD GREER, section foreman for several years with the Consolidation Coal Co., Jenkins, Ky., has resigned and joined the West Virginia Coal & Coke Corp., Omar, W. Va., as a mine foreman.

H. JOHN HARPER, Koppers Coal Division, Eastern Gas & Fuel Associates, has been promoted to general superintendent in charge of the following mines: Wharton, Kopperston Nos. 1 and 2, Carswell, Keystone and Maitland in West Virginia, and Weeksbury in Kentucky.

K. H. HUMPHRIES, master mechanic, New River Co., Mount Hope, W. Va., has been commissioned captain in the coast artillery.

ALEXANDER JACK, formerly senior federal mine inspector for the State of Alabama, has been named general manager of the Pennsylvania Coal & Coke Corp., Cresson, Pa.

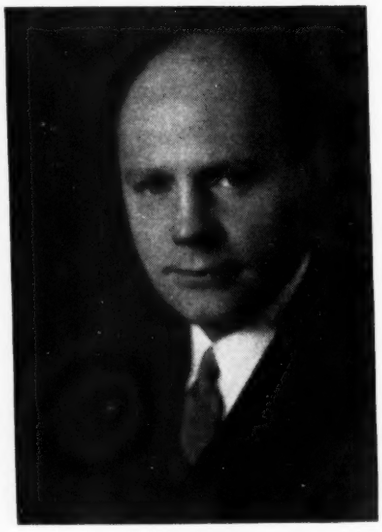
DAVID JENKINS, breaker foreman, Gravity Slope colliery, Hudson Coal Co., Archbald, Pa., has been transferred to Jermyn colliery, Jermyn, Pa., as outside foreman.

WILLIAM LAMONT, formerly State mine inspector for the 10th bituminous district of Pennsylvania, has been made general superintendent of the Sterling Coal Co., Bakerton, Pa. His predecessor, JOHN F. FOREMAN, contemplates going into the coal business for himself in the near future.

ROY S. LONG, Koppers Coal Division, Eastern Gas & Fuel Associates, has been promoted from superintendent at No. 5 mine to general superintendent of the following southern West Virginia mines: Powellton Nos. 3, 5 and 7; Beards Fork, Long Branch, Midvale No. 2, Glen White, Helen No. 9, Stanaford Nos. 1 and 6, and Stotesbury Nos. 8 and 11.

A. F. Brosky

J. W. Close



George H. Love

WALTER LONGMAN has been made superintendent of No. 2 mine of the Freeman Coal Mining Co., Herrin, Ill., vice J. H. SEYMOUR, deceased.

GEORGE H. LOVE has been elected executive vice president of the Consolidation Coal Co. effective March 17. He will have general supervision over the physical properties of the company. He also has been elected to membership on the board of directors and the executive committee and as chairman of the latter. He formerly was president of the Union Collieries Co. and vice president of the Western Pennsylvania Coal Operators' Association and is a director of the National Coal Association.

S. F. MCGURK has accepted a position as superintendent of Pyramid No. 1 mine of the Pyramid Coal Corp., Pinckneyville, Ill. Formerly he was superintendent of No. 2 mine of the Mt. Olive & Staunton Coal Co., Staunton, Ill.

J. M. MONHOLLEN, formerly mine foreman for the Columbus Mining Co., Christopher, Ky., has taken a similar position with the Hardy-Burlingham Mining Co., Hardburly, Ky.

H. L. OWEN has been named as coal inspector for the mines of the Elk Horn Coal Corp., in eastern Kentucky. He has been coal inspector for the Consolidation Coal Co., Jenkins, Ky., for several years.

ELKINS REED, mining engineer, of Kingston, Pa., has been appointed superintendent of the Jermyn-Green operation now under construction at Phoenix Park, Pa.

WARREN L. SHIRLEY, sectional foreman, Jermyn colliery, Hudson Coal Co., Jermyn, Pa., has been transferred to Eddy Creek shaft, Olyphant, Pa., as sectional foreman, vice Theodore D. Rees, appointed State mine inspector.

EDWARD N. STUART, company miner, Jermyn colliery, Hudson Coal Co., Jermyn, Pa., has been promoted to sectional foreman, vice Warren L. Shirley, transferred.

JAMES W. SWINDELHURST, outside foreman, Jermyn colliery, Hudson Coal Co., Jermyn, Pa., has been transferred to the Powderly colliery, Mayfield, Pa., as maintenance foreman.

ROY WILDER, for several years connected with the Elkhorn Jr. Coal Co., Millstone, Ky., as mine foreman, has become superintendent of the Diablock Coal Co., Diablock, Ky. He formerly was with the South-East Coal Co., Millstone, Ky.

CARL C. YOWELL has been promoted to superintendent of the Monarch and Imperial mines of the Blue Diamond Coal Co., at St. Charles, Va., vice C. KYLE TIECHE. For the last 17 years Mr. Yowell has been with the Wise Coal & Coke Co., Glamorgan, Va.

Safety Card Gets Results In Accident Prevention

To combat the danger of higher accident and fatality rates because of increased pressure on production for war purposes and the replacement by inexperienced workers of experienced men called to the colors, the Big Sandy-Elkhorn Coal Mining Institute has instituted a safety campaign which it reports is getting results. A feature of the drive is the distribution of red cards giving details following any accident. Printed in black ink, the red card reads somewhat as follows:

COAL LOADER KILLED
Feb. 30, 1943
John Doe Coal Co.
Mine No. 10

Richard Roe, a white American miner, age 45, with 20 years' experience, was instantly killed by a fall of slate at the face. Richard leaves his wife and six small children dependent.

MINERS, TEST YOUR ROOF FREQUENTLY. YOUR LABOR IS NEEDED FOR OUR WAR EFFORT. PRACTICE SAFETY FOR VICTORY.
(Signed) Big Sandy-Elkhorn Mining Institute

The slogans are changed from time to time, being worded to fit the particular accident being reported and with suggestions on preventing future accidents of the same kind. Besides advising miners of the district immediately of the occurrence of fatalities the purpose of the cards is to persuade miners, through the power of suggestion, to exercise extreme care to guard against accidents.

The institute, of which J. T. Parker is president and A. D. Sisk, secretary-treasurer, reports that for the year ending Dec. 31, 1942, the tons mined per fatality were exceeded by only one other year in its history.

Immediately after investigating a fatal accident the district mine inspector gives the following information to the secretary of the institute: name of deceased, age, occupation, nationality, experience, dependents, and how the accident occurred. The secretary prints this, adds the safety slogans, and mails one card to each mine, where they are placed on the bulletin board.

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New Preparation Facilities

COLITZ COAL CO., Pottsville, Pa.: contract closed with the Deister Concentrator Co. for No. 7 "SuperDuty Diagonal-Deck" coal washing table, No. 5 buckwheat.

COLYAR CO., Mt. Carmel, Pa.: contract closed with the Deister Concentrator Co. for No. 7 "SuperDuty Diagonal-Deck" coal washing table, pea.

LOCUST COAL CO., Shenandoah, Pa.: contract closed with the Deister Concentrator Co. for No. 7 "SuperDuty Diagonal-Deck" coal-washing table, No. 4 buckwheat.

MCALESTER FUEL CO., Carbon, Okla.—Contract closed with McNally-Pittsburg Mfg. Corp. for tipple and cleaning plant employing Norton automatic washer to handle 200 t.p.h. of mine-run with provision for crushing entire tonnage before washing and classifying into two sizes, 4x1¼-in. and minus 1¼-in., and provision for two additional loading tracks in the future, and with further provision for bypassing 2-in. plus coal in raw state; complete with McNally-Pittsburg rotary dump and two loading booms; to be completed about August, 1943.

MCALESTER FUEL CO., McCurtain, Okla.—Contract closed with McNally-Pittsburg Mfg. Corp. for tipple and cleaning plant to handle 200 t.p.h. of mine-run, washing 2½x1¼ in. and either loading plus 2½-in. lump in raw state or crushing it to 2½ in. and washing with 0x¼-in. bypassed in raw state, with future facilities for washing entire tonnage; also facilities for loading on three tracks with various mixtures of sizes; complete with McNally-Pittsburg rotary dump; to be completed about August, 1943.

MONTANA COAL & IRON CO., Washoe, Mont.: contract closed with the Deister Concentrator Co. for two No. 7 "Super-Duty Diagonal-Deck" coal-washing tables, re-treating jig refuse.

JONATHAN S. REBER, Bowmanstown, Pa.: contract closed with the Deister Concentrator Co. for No. 7 "SuperDuty Diagonal-Deck" coal washing table, No. 5 buckwheat.

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Rose Hill Ships First Coal

The first carloads of coal from a newly opened tract near Crooksville, Ohio, were shipped during the third week of February, according to James S. McVey, president of the company, who also heads the Central West Coal Co. The tract, comprising 2,000 acres of unworked land, was leased from the Eastern Hocking Coal Co. The company formed to work the new tract is the Rose Hill Coal Co., which is building a completely mechanized plant with mining facilities costing about $100,000. Gerald L. Wallace, president, Starr Jackson Mining Co., has been named general manager; Hal Webster, vice president, and J. E. Jones, secretary-treasurer.

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Coal-Mine Accident Fatality Rate Registers Another Decline

Accidents at coal mines of the United States caused the deaths of 96 bituminous and 17 anthracite miners in December last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors.

With a production of 48,400,000 net tons, the accident death rate among bituminous miners was 1.98 per million tons, compared with 2.06 in December, 1941.

The anthracite fatality rate from accidents in December last was 3.69, based on an output of 4,611,000 tons, against 4.61 in the twelfth month of the preceding year.

For the two industries combined, the accident fatality rate in December last was 2.13, compared with 2.26 in the corresponding month a year earlier.

Fatalities during December last, by causes and states, as well as comparable rates for the twelve months of 1941 and 1942 are as follows:

DEATHS AND FATALITY RATES AT U. S. COAL MINES, BY CAUSES OF ACCIDENTS*

January–December, 1941 and 1942

	Bituminous: Number Killed		Bituminous: Killed per Million Tons		Anthracite: Number Killed		Anthracite: Killed per Million Tons		Total: Number Killed		Total: Killed per Million Tons	
Underground:	1941	1942	1941	1942	1941	1942	1941	1942	1941	1942	1941	1942
Falls of roof and coal	574	587	1.116	1.019	100	133	1.840	2.218	674	720	1.186	1.132
Haulage	191	240	.371	.417	27	35	.497	.584	218	275	.383	.433
Gas or dust explosions:												
Local	23	19	.045	.033	8	9	.147	.150	31	28	.055	.044
Major	66	127	.128	.220	...	...	....	....	66	127	.116	.200
Explosives	24	19	.047	.033	12	12	.221	.200	36	31	.063	.049
Electricity	42	47	.086	.082	5	6	.092	.100	47	53	.083	.083
Machinery	39	39	.076	.068	...	1	....	.017	39	40	.069	.063
Shaft	9	7	.017	.012	6	2	.110	.033	15	9	.026	.014
Miscellaneous	26	31	.051	.054	14	10	.258	.167	40	41	.070	.064
Stripping or open-cut	34	19	.066	.033	6	4	.110	.067	40	23	.070	.036
Surface	44	56	.086	.097	16	12	.294	.200	60	68	.106	.107
Grand total	1,072	1,191	2.085	2.068	194	224	3.569	3.736	1,266	1.415	2.227	2.225

* All figures subject to revision.

UNITED STATES COAL-MINE FATALITIES IN DECEMBER, 1942, BY CAUSES AND STATES

State	Underground: Falls of Roof	Haulage	Gas or Dust Explosions	Explosives	Electricity	Machinery	Other Causes	Total Underground	Shaft	Open-Cut	Surface	Grand Total
Alabama	1	1	..	..	..	..	..	2	..	..	..	2
Colorado	4	..	..	..	..	..	..	4	..	..	..	4
Illinois	6	3	..	..	..	..	..	9	3	..	..	12
Indiana	..	1	..	..	..	..	..	1	..	..	..	1
Iowa	..	..	..	1	..	..	..	1	..	..	..	1
Kentucky	9	3	..	..	1	..	1	14	..	..	..	14
Montana	1	..	..	..	..	..	..	1	..	..	..	1
New Mexico	1	1	..	..	..	..	..	2	..	..	..	2
North Dakota	..	..	..	..	..	..	..	..	..	1	..	1
Ohio	3	1	3	..	..	..	..	7	..	..	..	7
Oklahoma	..	1	..	..	..	..	..	1	..	..	..	1
Penna. (bit.)	10	3	..	..	..	..	1	14	..	..	1	15
Utah	1	1	..	..	1	..	..	3	..	..	..	3
West Virginia	9	6	1	..	1	1	..	18	..	..	6	24
Wyoming	2	..	..	1	..	..	..	3	..	..	5	8
Total bituminious	47	21	4	2	3	1	2	80	3	1	12	96
Pennsylvania anthracite	11	2	1	..	1	..	..	15	..	..	2	17
Grand total	58	23	5	2	4	1	2	95	3	1	14	113

Anthracite Cave Commission Studies Subsidence Insurance

Meetings dealing with the mine-cave situation are continuing between the Anthracite Subsidence Commission, created by the Legislature of Pennsylvania, and the anthracite coal operators, to the end that certain suggestions of the commission may be discussed and probable remedies decided upon.

Duties of the commission are: (1) To investigate the problem of surface subsidence in the anthracite coal area with respect to its effect on property and human life; (2) to engage in any research necessary to discover effective remedies for the anthracite mine-cave problem; (3) to study decisions of the State and federal courts relating to the constitutionality and effect of earlier legislation relating to surface subsidence caused by mining; and (4) to make recommendations as to legislation which might be enacted by the General Assembly for effective regulation and control of anthracite mining and surface subsidence.

The commission has held public meetings in St. Casimir's Hall, Shenandoah; in the Luzerne County Court House, Wilkes-Barre; in the Lackawanna County Court House, Scranton, and there also have been meetings between the commission and the federal and State departments of mines. Visits to the affected areas also have been made, and oral and written testimony has been taken at every meeting or hearing. The areas found to be most affected are Shenandoah, Swoyersville, Duryea, Forty-Fort, Kingston and Pittston.

Problems facing the commission are to find some valid and practical means for preventing subsidence and for compensating property owners for damages sustained and at the same time to foster the conservation of coal and the economic and social prosperity of the coal regions.

There are 485 square miles of superficial area. Available figures indicate that 26 percent of the entire coal area is confined within the limits of "built-up" communities, under which the original coal content is estimated to have been 5,000,000,000 gross tons. During mining operations extending over 125 years it is roughly estimated that 50 percent of the original coal content under the improved areas has been removed.

All mine caves are laid to improper pillars or the deterioration or disintegration of pillars. While flushing might prevent pillar disintegration, it will not furnish an adequate support for the roof.

One operator spent a million dollars in repairing property over a period of nine years. Ninety-eight percent of this sum was spent on the repair of property although no legal obligation to so repair was incumbent upon the company. This operator was forced to close certain operations because it was impossible to continue payments for damaged property, and as a result 15,000 heads of families were deprived of their jobs.

The commission is studying a plan under which the General Assembly would appropriate a sum of money sufficient to inaugurate a form of subsidence insurance. Most active in the proceedings of the commission are Senator Edward J. Coleman, of Lackawanna County, and Senator G. Harold Watkins, of Schuylkill County. Other members of the Commission are: George B. Stevenson (chairman), J. Fred Thomas, John E. Cox, Harry P. O'Neill, Walter Gryskewicz, Homer S. Brown, Arthur P. Bretherick and Earl E. Hewitt.

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New East Kentucky Operation Started by Republic

The Northern Coal Mines District of Republic Steel Corp., acting for the Defense Plant Corp., has started to open a new coal mine in a virgin coal field of Pike County, Kentucky. Large acreages of the Upper and Lower Elkhorn seams, containing high-quality metallurgical coal, are being developed to produce coal for a new steel plant. The Chesapeake & Ohio Ry. will serve this property by a new extension. The branch line and mine sidetracks were completed in January, 1943.

Much of the preliminary opening work has been done on the plant site. A contract has been awarded for erection of a coal-cleaning plant, conveyors down the mountainside, mine tipple and refuse-disposal facilities for a 200-tons-per-hour plant. The Chance sand flotation process will be used.

The Lower Elkhorn mine portal will be 360 ft. above the cleaning plant and railroad elevation. Coal will be discharged from mine conveyor belt into a tipple on the mountain, thence by rope-and-button conveyor and belt conveyor to the cleaning plant.

Underground transportation of coal will be by belt conveyor and shuttle cars. Caterpillar-mounted cutting and loading machines will mine the coal. Mine supplies and men will be delivered by locomotive and mine cars to the mining sections. All coal will be loaded mechanically.

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Association Activities

WILLIAMSON COAL OPERATORS' ASSOCIATION reelected L. E. Woods as president at its annual meeting, Feb. 12. Mr. Woods, president of the Crystal Block Coal & Coke Co., has headed the group for twelve years. Other officers named by the association, which represents operations in Mingo and McDowell counties, West Virginia; Pike County, Kentucky, and Buchanan County, Virginia, include: Charles A. Hamill, vice president; J. D. McLaughlin, treasurer, and Joseph J. Ardigo, secretary.

SOUTHERN APPALACHIAN COAL OPERATORS' ASSOCIATION reelected its officers and directors at its annual meeting in Knoxville, Tenn. Officers are: L. C. Gunter, president and secretary; B. E. Cheely, first vice president; D. E. Griffith, second vice president; directors: C. S. Blair, Alex Bonnyman, J. E. Butler, B. E. Cheely, D. E. Griffith, C. W. Henderson, W. C. Hutcheson, E. C. Mahan, T. R. Mitchell, S. G. Moore, N. B. Perkins, Sager and J. B. Gatliff.

Army Engineer School Seeks Ideas From Civilians

The Engineer School at Fort Belvoir, Va., which has operated a suggestion system for more than a year, seeks ideas from civilians for army use. Every suggestion is judged by competent critics; to date, 11 percent of soldiers' suggestions have been adopted and put to use.

Ideas are sought concerning bridges, camouflage, construction, design, drafting, equipment, logistics, machines, maintenance, maps, materials, material handling, methods, packaging, photography, power, printing, publications, rigging, roads, safety, sanitation, standards, specifications, storage, strategy, surveying, tactics, traffic, training, transportation and water.

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Young Heads New Division To Boost Mineral Supply

Plans to coordinate and correlate the broad programs of all governmental agencies for increasing the supply of essential minerals and metals were announced Jan. 30 by War Production Board Chairman Donald M. Nelson. He revealed the establishment of a Mineral Resources Coordinating Division, to be aided by a Mineral Resources Operating Committee and a Minerals and Metals Advisory Committee. Howard I. Young, St. Louis, Mo., president of the American Zinc, Lead & Smelting Co., was appointed director of the new division and to act as chairman of the two committees.

"To aid Mr. Young in reaching decisions concerning the development of resources," said Mr. Nelson, "two new groups have been established. The larger, called the Minerals and Metals Advisory Committee, comprises representatives of all the major governmental agencies concerned with the production of ore. These include: War Department, Navy Department, Board of Economic Warfare, Reconstruction Finance Corporation, Bureau of Mines, Geological Survey, Bureau of Foreign and Domestic Commerce, Office of Civilian Supply, WPB; Office of Production Research and Development, WPB; Facilities Bureau, WPB; Labor Production Division, WPB; Stockpiling and Transportation Division, WPB.

"The smaller group, called the Mineral Resources Operating Committee, will be composed of a representative to be named by the Secretary of the Interior and representative of the Board of Economic Welfare, the Reconstruction Finance Corporation and the Office of Production Research and Development, WPB, in addition to Chairman Young.

"At meetings of the two committees, all proposals and programs can be thoroughly discussed. The broad, general picture of such plans will be presented by the Advisory Committee and more specific working programs will be considered by the Operating Committee.

"In this way proposals for investigating and exploring ore bodies and for testing, developing and utilizing new processes for production of minerals and metals will represent the combined efforts of all groups to increase raw material supply.

"Only those proposals and programs reviewed and recommended by the Operating Committee will be considered for final approval."

Under the new arrangement, the Mineral Resources Coordinating Division will be responsible for coordinating plans, programs and procedures within WPB and with the other governmental agencies. It also will assemble recommendations for increasing the minerals supply. It will advise the program vice chairman in these respects.

Wilbur A. Nelson, head of the WP Mining Branch in 1942, has been named to assist Mr. Young as Deputy Director of the Mineral Resources Coordinating Division.

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Miners Awarded War Bonds For Safety Records

Six months of service in the Reliance (Wyo.) mines of the Union Pacific Coal Co. without losing a day of work brought Roy Hautala a $1,000 war bond when he was chosen from 650 of the company's employees at Reliance, Winton, Superior, Hanna and Rock Springs, Wyo., who had worked every day their mines worked. Frank M. Coultus, Winton, also received a $1,000 bond for six months' work without a lost-time accident.

Other safety award winners for the last six months of 1942 are: Gilbert Larson, Rock Springs, $75 bond; Henry Smith Sr., Superior, $50 bond; John Freeman, Hanna, and Charles Yardas, Reliance, one $25 bond each; and Tony Turak, Superior, suit of clothes.

The awards were made at the semi-annual meeting of the company, when more than $2,200 in prizes, mostly bonds, were bestowed for work attendance and for safety.

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WPB Ignores Appeal to Relax Anti-Smoke Laws

For the ostensible purpose of saving materials for at least 1,000 new steel coal cars, Representative Calvin D. Johnson (R., Ill.) proposed late in January to Donald M. Nelson, War Production Board chief, that the St. Louis and Chicago anti-smoke ordinances be suspended for the duration. Mr. Johnson added that the WPB chief was considering the feasibility of the proposal.

The Illinois legislator said that present annual shipment of 9,600,000 tons of smokeless coal from West Virginia fields to Chicago and 650,000 tons to St. Louis could be avoided if the two cities relaxed their smoke ordinances and used coal from the nearby Illinois fields. He said he had assured Messrs. Nelson and Jeffers (rubber czar) that "there are plenty of miners—at least 1,400—in the Belleville area who would be available immediately if the mines were opened."

WPB officials said on Feb. 12 that the board was taking no action on the Johnson proposal, having found that Illinois and Indiana mines were already "oversold," they said.

Arc Welding Boomed by War, Mining Electric Men Told

"Coal mines must now compete with manufacturers and also with priorities in the production of machine parts," declared V. V. Netch, electric welding engineer, Hill Equipment Engineering Co., St. Louis, Mo., at the February meeting of the Mining Electric Group, West Frankfort, Ill. Mr. Netch continued: "Arc welding is as important as any other repair tool." Suggesting that we need to get back to some fundamentals, he discussed the characteristics of cast iron and mild steel, pointing out why fabricated steel is replacing cast iron for many types of tool construction. Rolled steel, he said, is superior in strength, rigidity and ductility.

Test specimens of arc welds have established several important characteristics which prove the value of arc welding to industry:

1. The weld metal is stronger than rolled steel.
2. Weld metal resists corrosion better than the parent metal.
3. It is difficult to make a bad weld in a flat position. A prominent fabricator of steel structures did not believe the assertion that a green welder could do a passable (flat) welding job. So it tried its office girls and found their work passed too.

The policy of the Lincoln Electric Co. is that the design of structures, machines and parts should be reviewed every five years for possible ways of doing the job better. "The ultimate is always ahead of us."

There are several trends in the arc-welding industry that indicate its importance and the efforts of government to force electrode production to meet wartime demands:

1. Reduction in the number of sizes of welding rods, and the sizes pushed up. Not more than 20 percent of the product may now be in $\frac{1}{8}$- and $\frac{5}{32}$-in. sizes, by order of the War Production Board. This has resulted in more production and faster welding—"a step in the right direction," says Mr. Netch.
2. Governmental orders are that there are to be no more riveted buildings for the duration.
3. A new welding rod is out that has deeper penetration. Since penetration rather than fillet appearance gives strength to the weld, welds made with the new rod are much stronger. It has speed features too.
4. The rate of production of welding rod, vastly upped by shipbuilding needs, travels like a streamliner. Production per month in 1936 was 1,500,000 lb.; 1940, 7,000,000 lb.; 1942, 63,000,000 lb.; and for 1943 WPB seeks 110,000,000 lb.

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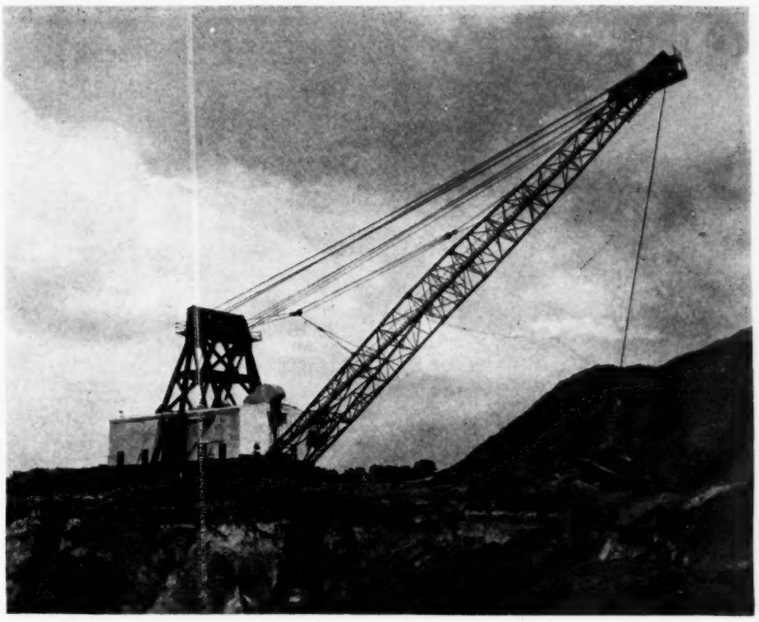
Obituary

GEORGE BRYANT MCCORMACK, president of the Moss & McCormack Coal Co., which he founded with G. L. Moss about 20 years ago, died Feb. 9 in Birmingham, Ala., after a long illness. He was a son of George B. McCormack Sr., also a pioneer in the mining industry, and a brother of Carr McCormack, president of the New Castle Coal Co. Moss & McCormack closed down its mining operations about a year ago.

ANDREW MOFFAT, 50, superintendent, Moffat Coal Co., Sparta, Ill., was killed Feb. 5 by a trip of cars which broke loose and raced down the slope entrance to the mine. He had been connected with coal mining in Illinois and Ohio since young manhood.

JAMES B. NEALE, retired coal operator,



World's largest dragline, digging 25 cu.yd. at a time, built by Marion Steam Shovel Co., was recently placed in operation in a coal-stripping in northern Illinois. The walking motion is controlled by the Rototrol, a Westinghouse development, which minimizes stresses and shock on the entire machine.

formerly connected with the firm of Thorne, Neale & Co., Inc., died Feb. 11 at his Buck Run home, near Pottsville, Pa. Graduated from Yale University in 1896, he entered the anthracite industry at Pittston, Pa., working his way to superintendent of the Mt. Pleasant colliery, at Scranton, later holding similar positions at the Twin Shaft and Old Forge collieries, at Duryea. In 1900, with the late S. Brinckerhoff Thorne, he founded the Buck Run Coal Co., with operations at Buck Run. In 1904 the firm took over the Darkwater Coal Co. and six years later formed the selling organization of Thorne, Neale & Co.

JONAS WAFFLE, for more than 25 years identified with the coal industry in Indiana, died Feb. 17 at his home in Terre Haute. Since 1917 he had been intimately associated with the Coal Trade Association of Indiana as traffic manager and managing director. He was managing director of the Indiana Coal Code Authority under NRA, and in recent years had been manager of the Bituminous Coal Producers' Board for District No. 11.

DAVID S. HANLEY, connected for many years with the Pacific Coast Coal Co., Seattle, Wash., of which in recent years he was vice president, died Feb. 6. He also had been active for years in the Coal Producers' Association of Washington.

JOHN MARSHALL FERGUSON, 62, senior partner of the Ferguson-Gates Engineering Co., Beckley, W. Va., died Jan. 30 at Beckley after a brief illness. He was graduated in 1903 in civil engineering from Washington and Jefferson College, Washington, Pa. After several years with a railroad company he went with a coal company in western Pennsylvania, from 1915 to 1917 was in private consulting engineering practice in Pittsburgh, then went to Beckley, starting a new firm in 1917 which became the Ferguson-Gates company.

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West Virginia Considers Bill To Revise Mine Laws

Modification of the mining laws of West Virginia calculated to safeguard coal miners is provided for in a lengthy bill now before both houses of the Legislature. Designed to enact into statute certain rules now in effect through executive order, the measure would give the chief of the State Department of Mines power to enforce its provisions. The bill was written by the Legislature's Interim Committee following protracted hearings late last year (*Coal Age*, December, 1942, p. 116) and identical measures were introduced by Senate President Paull and House Speaker Amos. An amendment to the measure as originally drafted would empower the Mine Department chief to suspend operation of some regulations upon cause shown by operators. Safety provisions recommended by the committee are:

1. That each mine official with supervisory duties, other than the superintendent, be certified by the Department of Mines as competent to preserve mine safety.
2. Inspection of working by certified official every 3½ hours during shifts, in addition to the usual fireboss patrols.
3. Instead of having fireboss stations only in gassy mines, "danger" stations should be set up in all operations against any hazard whatsoever.
4. Systematic timbering plans to educate miners in the importance of roof control. (The committee said this was putting into law what is now a practice of all enlightened operators.)
5. Safeguards in ventilation by cutting down the number of doors in favor of overcasts.
6. Adoption of the "Ohio plan" on permissible machinery in mines. The section provides that as non-permissible machinery wears out in gassy mines it should be replaced and in no event shall there be any non-permissible machinery ten years hence.

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Coal Production Resumed In North Carolina

The first car of coal to be mined in North Carolina in almost two decades has been shipped from the Carolina mine, in Chatham County. The car was consigned to the Atlantic & East Carolina Ry. (the "Mullet" Line) and will be tested in fireboxes of the railway's locomotives.

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Acquires Eureka No. 2 Mine

Forsyth Carterville Coal Co., Carterville, Ill., has taken over the Eureka No. 2 mine at Tilden, Ill., and will operate it. Formerly operated by Jones Brothers, Marissa, Ill., this mine has been idle for several years.

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Republic Blows In More Ovens

Republic Steel Corp. has placed in operation 65 new coke ovens at Gadsden, Ala., giving the plant 102 ovens in production there, according to District Manager E. I. Evans. The ovens will furnish ample coke for the old 600-ton blast furnace and the new 800-ton stack blown in last June.

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Buy Bethlehem Fairmont Stock

All of the stock of the Bethlehem Fairmont Coal Co., Fairmont, W. Va., has been purchased by C. L. Amos and H. W. Showalter, who now are, respectively, president and vice president and general manager. The company is producing more than 2,000 tons per day.

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P. & R. Acquires Pine Hill

The Philadelphia & Reading Coal & Iron Co. has acquired the physical assets of the Pine Hill Coal Co. as of Feb. 1, on which date it took over operation of the colliery. The property, which is near Minersville, Schuylkill County, Pa., comprises a modern Chance-cone-equipped anthracite preparation plant known as Oak Hill breaker, together with mining operations at the Oak Hill and Pine Hill shafts as well as a stripping operation.

The new owner contemplates extension of mining and stripping operations to its adjoining property in the Pine Knot Basin, where mine workings withdrawn from service in 1931 will be reopened and rehabilitated.

Good Neighbors Cooperate in Coal Study

Americo Albala (center), consulting engineer in the Ministry of Economics and Commerce of Chile and executive secretary of the Pan American Institute of Mining Engineering and Geology, which held its first sessions last year at Santiago, has been commissioned by the Chilean Government to spend 18 months in the United States to study ways of utilizing coal. He will spend the first ten months learning methods of reducing coal to liquid fuel in the fuel technology laboratories of Pennsylvania State College. His investigations are under the supervision of Dr. A. W. Gauger (left), director of the Mineral Industries Experiment Station and head of the Department of Fuel Technology, and Dean Edward Steidle (right), head of the School of Mineral Industries at the college. Chile has practically the only coal in all the Spanish-American countries, but it has no gas, no oil and no coke. Consequently the purpose of Mr. Albala's study is to ascertain methods of converting coal into liquid fuels and metallurgical coke, which Chile is now forced to import. At the completion of his graduate study at Penn State, Mr. Albala proposes to study industrial methods before returning to South America.

World's Smallest Explosive Charge

HERE'S a rivet that's making history. It's the Explosive Rivet—a new development by du Pont.

To you who shoot dynamite by the stick, case, or ton, the Explosive Rivet is of more than passing interest. It's a dramatic example of the control achieved by du Pont over the action of explosives. For this rivet is a precision product in which uniformity of results must meet the high standards required for America's finest military aircraft.

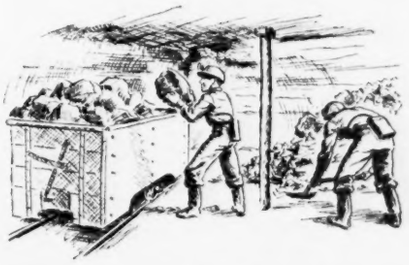
In the rivet shank there's a tiny explosives charge. It's the smallest "load" used in industry, yet the job it does in millions of Explosive Rivets speeds aircraft production.

SAVE FATS FOR EXPLOSIVES

Fats are urgently needed for making glycerin—an essential ingredient in the production of high explosives. Urge housewives to aid the war effort by taking waste fats to their butcher.

Explosive Rivets speed up "blind" riveting—that is, riveting in places where you can't reach one side of the rivet to back it up. To "drive" or set these rivets you simply apply the tip of an electrically-heated iron to the rivet head. In 2 seconds, or less, the heat fires the charge, forming a perfect, barrel-shaped head on the blind end.

At du Pont the same men, the same fund of experience, and the same laboratory facilities responsible for perfecting and manufacturing Explosive Rivets are constantly at work producing new and better commercial explosives and blasting supplies. Thus, whether your job is to bring down big, shatter-proof lump coal—to drive a tunnel through hard rock—or to quarry stone, you can count on Du Pont Explosives Research for the finest in explosives. E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington, Del.



DEPENDABLE DU PONT PRODUCTS FOR COAL MINING

DU PONT PERMISSIBLES—over 20 different types and grades give a selection that assures efficiency on every job.

ELECTRIC BLASTING CAP—reliability proved by over one billion sold to date. Metal foil shunt gives protection of positive short circuit until ready to fire.

DU PONT
REG. U. S. PAT. OFF.

EXPLOSIVES

AMAZING NEW INVENTION GIVES 50% MORE HEAT

So revolutionary, the

Tremendous Sales Opportunity For Dealers Everywhere

Amazed heating engineers pronounce the CONSERVATOR by far the most economical home heater the world has ever seen. New principles in design make it actually 50% *more* efficient than the *best* that could be bought until now. It makes all other semi-portable heating units *obsolete* from a performance standpoint!

Exhaustive laboratory tests under rigid supervision prove that the CONSERVATOR delivers 51,000 BTU per hour, which is 59% higher than other magazine type heaters.

Because of its astounding efficiency performance, the Model 20 CONSERVATOR has been granted an official release so that it can be produced and sold at once. *Satisfy* your customers—gain their good will by offering them the heater that tests have proved is *by far the best.*

Here's Your Market!

Thousands of home-owners and business firms will beat the fuel oil shortage by installing the CONSERVATOR to provide *auxiliary* heat.

Other thousands will want to dispense entirely with their present costly and uncertain fuel when they learn the advantages and trouble-free operation of the CONSERVATOR.

Still more thousands of homes and business places without central heating equipment will decide to install the CONSERVATOR because of its fuel economy. In many cases this marvelous new heater will pay for itself in less than two months in lower heating bills!

Dealers who have seen the CONSERVATOR hail it as opening the way to greatly increased sales—and profits—both now and in the post-war period. Write now for details and name of manufacturers in your territory licensed to produce the CONSERVATOR.

These carefully checked reports from just a few enthusiastic users are almost unbelieveable!

The owner of this 8-room house in Philadelphia says: "The Conservator will heat my home for the entire heating season for about $30. Last year my oil bill was $149. The Conservator keeps every room in the house comfortably warm. No odor, no soot, no muss—it's trouble-free!" (Living room of this house is shown above.)

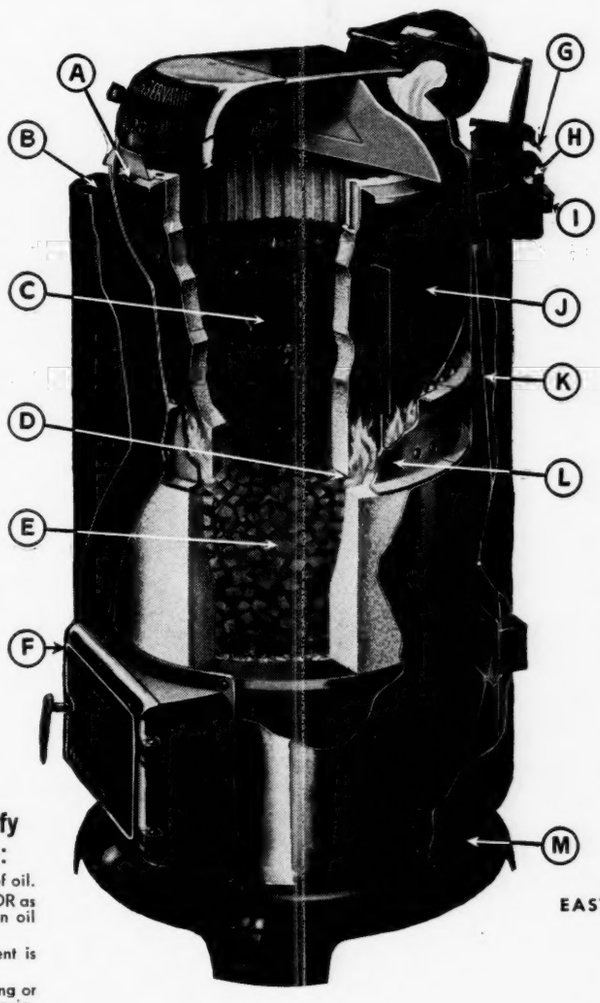
The Conservator circulating heater in this large, 3-story home in Topton, Pa., replaces **three** stoves previously used for heating. Accurate tests on a cold winter day showed average temperature maintained by the Conservator to be 76 degrees on the first floor, 72 degrees on the second, and 68 degrees on the third floor!

The owner of this fine 10-room home in Paoli, Pa., says: "Our gas bill last year was over $300 for the ten months of the heating season. On this basis, our Conservator has paid for itself in only two months—in savings on fuel bills alone. In average winter weather, we use our gas furnace to provide auxiliary heat for only a short time daily."

THAN OTHER COAL HEATERS

Government has given production go-ahead

A. Air from below grates enters here, forcing volatile elements downward.
B. Cold room air that entered at base of casing is heated and emerges here, causing circulating pressure to force warm air throughout house.
C. Coal baked here. Volatile elements driven down.
D. Louvres and slits in firebrick ignite mixture.
E. Coal reaches main combustion chamber as almost pure carbon.
F. Air-tight ash pit. All entering air is measured through controls.
G. Control clutch disengages thermostat while ashes are removed.
H. Primary air thermostat acts on room temperature.
I. Temperature regulator dial.
J. Mixture diverted to achieve thorough combustion.
K. Secondary air thermostat admits measured amount of pre-heated air—the secret of most efficient combustion.
L. Volatile elements mix with secondary air from manifold and burn in auxiliary combustion chamber.
M. Cool air in house drawn in here to be heated.



Your Customers Can Qualify for a CONSERVATOR Now:

1. If they wish to use coal heat instead of oil.
2. If they wish to use the CONSERVATOR as an auxiliary heater and cut down on oil consumption.
3. If their present coal-heating equipment is damaged or worn beyond repair.
4. If they need a heater for essential living or working space not heated by any equipment, provided they have not disposed of any usable heating equipment for heating such space in the past 60 days.

THESE FEATURES WILL SELL MILLIONS!

1. One filling of the magazine lasts several days in average weather—one filling per day is enough for coldest weather.
2. Burns **more** of the coal—only a fine ash remains. No muss—ash falls into removable container in dust-tight compartment.
3. Ashes need be removed in handy container only once every few days in normal weather. Produces far less ash than any other stove, because combustion is so complete.
4. It is the world's most **economical** coal heater—reduces heating bills by more than two-thirds in many cases.
5. Light it **once** and it will burn all winter without rekindling.
6. No smelly odors—no soot to soil furniture or curtains.
7. Burns anthracite, bituminous coal, or coke—all domestic sizes.
8. It is a circulating heater—not a radiant type—thus making it possible to heat the whole house while maintaining a comfortable temperature in room where it is installed.
9. The only coal heater with automatic thermostatic control—no dampers to watch. The famous Conservator 3-way Thermostatic Control takes care of everything.
10. Attractively finished in black porcelain enamel to assure long life. Easy to keep clean and shining. No stove polish needed.
11. So efficient and so economical, the Conservator will positively pay for its cost in a single heating season by the savings in fuel bills, compared to the cost of using oil or gas.
12. Easy to install—only a fireplace opening or simple flue arrangement needed.

EASTERN RETAIL CEILING PRICE

$57.00

ROCKY MOUNTAIN AND PACIFIC COAST—$60.80

ALL KINDS OF SELLING HELPS FOR YOU

CONSERVATOR dealers will be provided with every possible promotion and advertising helps, including:

WALL CHARTS, ILLUSTRATING NEW HEATING PRINCIPLES.
ADVERTISING MATS FOR NEWSPAPER USE.
FLOOR SALESMAN'S MANUAL.
HAND-OUT DESCRIPTIVE FOLDERS FOR CUSTOMERS.

In addition, manufacturers will conduct local advertising campaigns in newspapers, directing readers to their nearest dealer.

CONSERVATOR

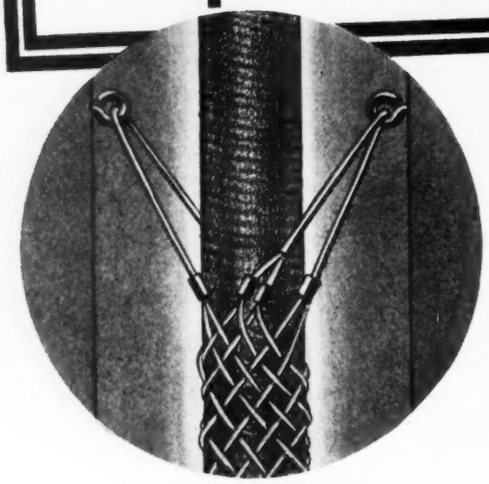
MANUFACTURED BY

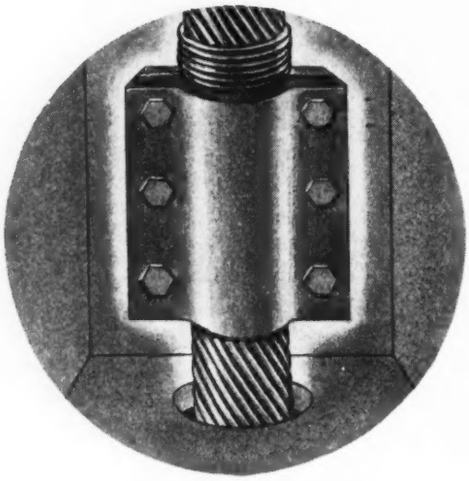
CALORIC GAS STOVE WORKS

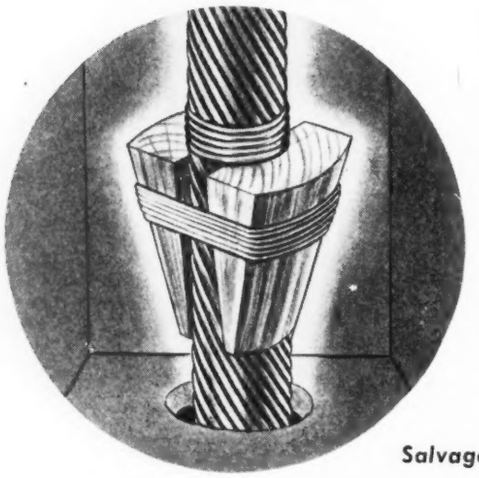
Trenton & Tioga Sts., Philadelphia, Pa.

LICENSED UNDER CONSERVATOR PRODUCTS CO. PATENTS

Shaft and Borehole Cables are Your First Line of Operating Defense!







FOR NEW INSTALLATIONS:

The selection of the proper type of cable to install for a specific application is important. For example, it is not always necessary to use heavy and costly lead-sheathed power cables for suspension in boreholes and shafts. Hazard Mine Power Cable is light in weight and at the same time very sturdy. They are much easier to handle. The design differs in that a fibrous or impervious jacket is substituted for the lead sheath. They are moisture-resisting, tough, long lasting and unaffected by mine acids. Two types of finish are ordinarily recommended, Spiralweave and Steel Armor. The former has a heavy "firehose" covering of cotton cord, woven tightly over the taped rubber sheath and thoroughly saturated with weatherproof compound and finished with flake mica. The latter type (Steel Armor) has a cushioning layer of asphalted jute placed over the taped rubber jacket, a full layer of galvanized steel armor wires and an outer layer of asphalted jute. This type is recommended where extra mechanical protection or suspension strength is necessary.

FOR EXISTING INSTALLATIONS:

To assure an uninterrupted power supply for mining operations, shaft and borehole power cables should be well maintained and adequately protected. For example, they should be protected from sabotage or damage by the use of concealed secondary supports. We do not recommend squeeze type grips for permanent supports as they may crush the cable. We do suggest the methods described on pages 24 and 25 Hazard Catalog "Electrical Cables for Mining Use". In addition to the usual fencing-off precautions, a few suggested wartime secondary emergency measures to prevent cable from dropping down shafts or boreholes are illustrated.

Hazard engineers are experts in the selection and protection of mining cables for all applications. Why not consult them?

HAZARD INSULATED WIRE WORKS

DIVISION OF THE OKONITE COMPANY

Works: Wilkes-Barre, Pa. • Offices in Principal Cities

HAZARD ARMY E NAVY

Electrical Cables for Every Mining Use

Salvage Your Scrap — Buy U. S. War Bonds

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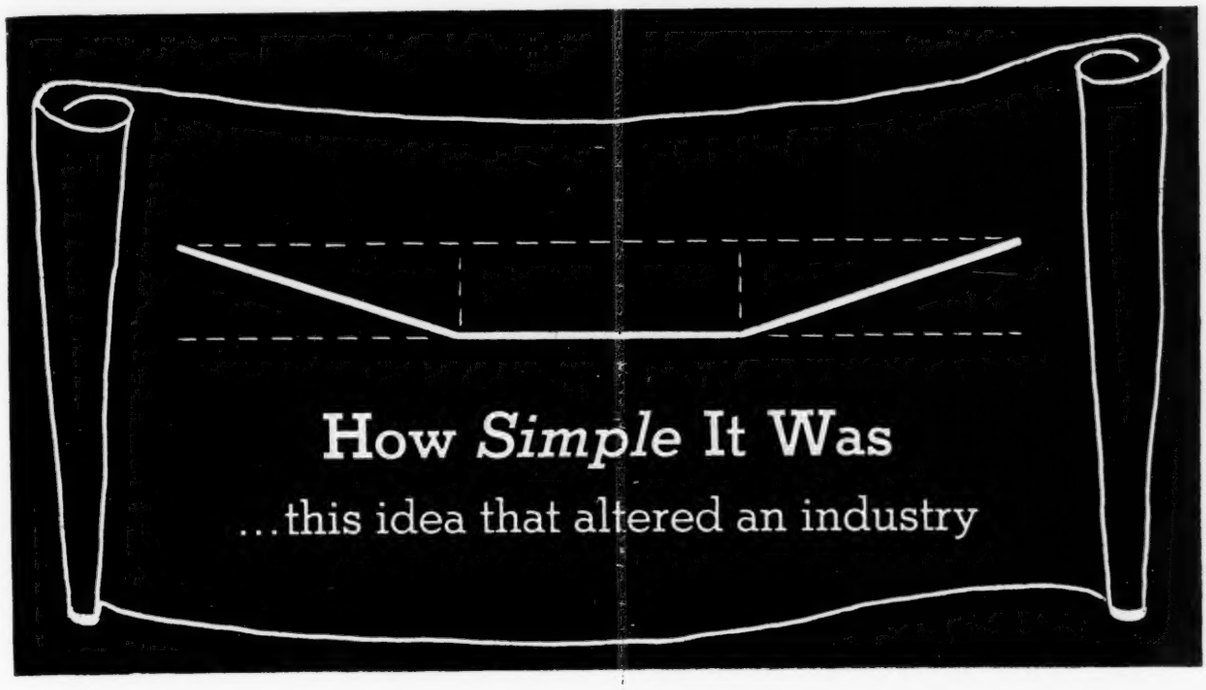
Long the Leader . . . Ever a Pioneer



MIRACLES are usually modest; they seldom clamor for attention. Yet their effects can sometimes change an entire industry.

At least, that is what happened when Thomas Robins developed his second invention. Having made the first belt created especially for conveying materials, Mr. Robins was still not content. He felt that further improvement was necessary . . . that a belt running *flat* was wasteful; it carried only a limited quantity of material and usually dropped much of that material along the way. So his fertile mind attacked this second problem.

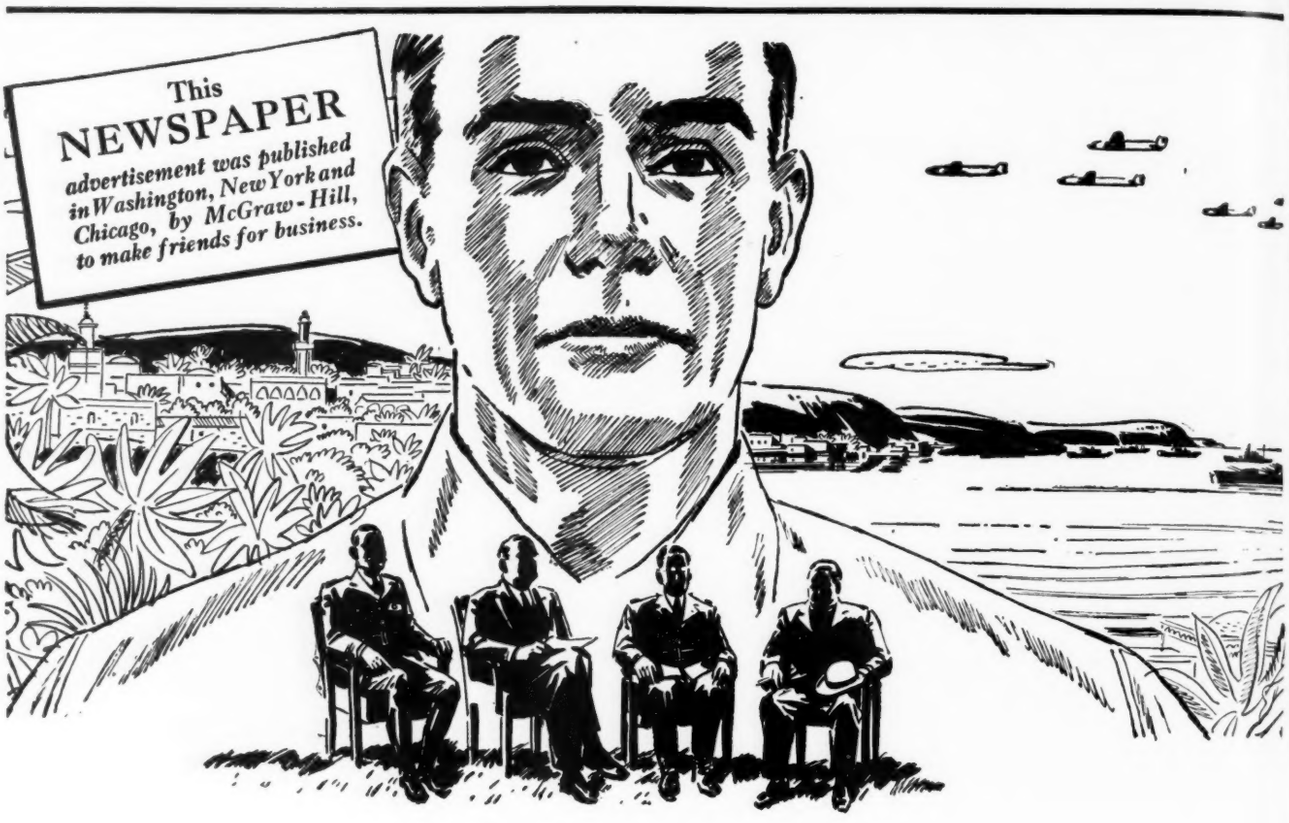
The First Troughed Belt Conveyor. The first step was to try running a belt in a trough formed by spool-shaped idlers. As could be expected, the varying diameters of the spools caused friction which quickly destroyed the underside of the belt. Then Mr. Robins invented the Troughing Idler so common today—cylindrical pulleys set on angle brackets to raise the sides of the belt.

The present firm of ROBINS has an extensive department devoted to the manufacture of all types of Idlers: Troughing, Training, Rubberdisc and Return. All types possess the customary ROBINS qualities: efficiency, economy, endurance. Careful buyers—everywhere—prefer them.

ENGINEERS • FABRICATORS • ERECTORS
OF
MATERIALS HANDLING MACHINERY

ROBINS
CONVEYING BELT COMPANY
PASSAIC • N. J.

For Material Aid in Materials Handling . . . It's ***ROBINS***



* * * * YOU * * * *
were at Casablanca

THE interesting thing about this Casablanca business is the terrific wallop our country is packing in international affairs these days.

We've been on the muscle just a little more than a year, now, but the boys who came up through the prelims are already calling us "Champ" . . . and it looks as though the other corner of the ring is beginning to dread the finals.

▶ How come? It wasn't so long ago that Brenner Pass and Berlin meetings were dominating the world's headlines.

YOU made the difference. "You" meaning every American who worked hard last year in America's war industries. Because a statesman, or a general, can only be as good as the industrial strength he represents.

▶ By the very act of shunting America's mighty industries from making peacetime things like automobiles and streamlined trains to making wartime things like ships, bombers and guns, the voices of your representatives were magnified from whispers to thunder in the councils of war.

YOU were at Casablanca (*Cont'd*)

If that makes you feel pretty proud, as a part of the industrial system that is going to burn the bearings of the Axis, maybe you'd better think about what is going to happen to our industry (and, incidentally, to your job) after the war is over.

▶ Things could get in a terrible mess, you know. We'll have the biggest debt in the history of the world, and 10 million soldiers and sailors to find jobs for.

The only thing that will save us will be the last thing most folks will think of—making it easy for business to grow.

If business grows, jobs grow.

Good business is the source of all good living.

America invented the method that produces better living. Here it is:

1. Constantly improve the equipment available for the worker.
2. Use the lowered costs thus produced to
   (a) Lower prices to consumers.
   (b) Improve the standard of living.
   (c) Provide incentives for invention, leadership and investment.
   (d) Lay aside "Seed Money" that can be used to start over again at item 1.

That's all there is to it. That's what gave us the highest living standard on earth. It can take up the job after the war, taking care of you, the soldiers, the sailors, and the war debt—IF it is allowed to operate.

But there are hundreds of laws that gum the works. Both business and labor need laws, the same as any other humans, but they need laws that will *lubricate* the industrial machine.

Let's take two of the gummy ones: There's a law that says a business must take 20 years to charge off a machine. Look what that does to item 2 in our "recipe for good living." Most machines are obsolete in 5 years, and government should encourage scrapping them. Obsolete machines *prevent* lower costs and *keep* wages down.

Another law, the excess profit tax, confuses business profit ("Seed Money") with private profit. In preventing a crop of war millionaires, this law also takes away most of the "Seed Money" that business should be saving for the big expense of converting back to peacetime work.

That law ought to be changed. If you think so, too, ask your congressman to study all laws with this principle in mind:

"What's Good for Business is Good for Americans"

Down to river's edge from the northwest, land of the tall timber, come giant Mack trucks bearing thirty-ton loads of logs . . . cut from centuries-old trees for the war needs of today.

TIME DOES TELL . . . PLENTY!

The Mack trucks you see on the road today are of all capacities. But there's one thing they have in common. *Being Macks, they're built to last!* That's a basic Mack advantage, doubly important in wartime when replacements are hard to get. Seven of every ten Macks built ten years ago are still on the job. For forty-three years Mack trucks have established a record for long life that is still gaining on home front and battle front alike. The expression "Built like a Mack truck" was not coined by us, but by those who watch Mack trucks at work.

Mack Trucks, Inc., Long Island City, N. Y. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J. Factory branches and dealers in all principal cities for service and parts.

Mack

TRUCKS
FOR EVERY PURPOSE
ONE TON TO FORTY-FIVE TONS

BUY U. S. WAR BONDS

IF YOU'VE GOT A MACK, YOU'RE LUCKY . . . IF YOU PLAN TO GET ONE, YOU'RE WISE!

FROM ROOF TIMBERS *to* HAULAGEWAY TIES..

TREATED WOOD ADDS EXTRA SAFETY

MINE management men everywhere are discovering the *new* safety factors inherent in Chromated Zinc Chloride-treated timbers. They're insisting on CZC-treated timbers and ties . . . and protecting men and mines in the following three important ways.

ONE. Roof falls due to timber failure cease to be a constant hazard. And when timbers and lagging are CZC-treated throughout, replacement and maintenance are minimized.

TWO. Haulageway derailments due to failure from decay are practically eliminated. Maintenance man-hours can be sharply—and safely—reduced.

THREE. CZC gives timber and ties measurable fire-resistant qualities.

The long life of CZC-treated timber rapidly overcomes its slightly higher initial cost. It is many times more durable than untreated wood. It resists decay, retards fire and is odorless. It is clean to handle.

Get *all* the facts on CZC-treated timber and ties. Write for your copy of "Wood Preservation for Mines." Grasselli Chemicals Department, E. I. du Pont de Nemours & Co. (Inc.), Wilmington, Delaware.

DU PONT
REG. U. S. PAT. OFF.

CZC

CHROMATED ZINC CHLORIDE

BETTER THINGS for BETTER LIVING . . . THROUGH CHEMISTRY

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT : "OPPORTUNITIES" : EQUIPMENT
BUSINESS : : USED OR RESALE

UNDISPLAYED ——RATES—— DISPLAYED

10 CENTS A WORD. MINIMUM CHARGE $2.00.
Positions Wanted (full or part time individual salaried employment only), ½ the above rates payable in advance.
Box Numbers—Care of publication New York, Chicago or San Francisco offices count as 10 words.
Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Individual Spaces with border rules for prominent display of advertisements.

The advertising rate is $6.30 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.

NEW ADVERTISEMENTS received by March 29th will appear in the April issue, subject to limitations of space available.

POSITION VACANT

GRADUATE DESIGNER and draftsman for general plant and mine engineering particularly structural and material handling. Excellent working conditions. Liberal salary. State recent wage. P-664, Coal Age, 520 N. Michigan Ave., Chicago, Ill.

WORK WANTED

LARGE CREW of the best working men been working coal mines for many years before looking for steady work. Go anywhere. High references furnished. Write Phill Mancuso, 646 Hegney Place, Bronx, New York, N. Y.

FOR SALE

JOY LOADER, Bradford Breaker Outfit. Four 12 Cubic Yard Sidedump Railroad Cars. Two Skips or Cages, Hoisting Engines, Steel Headframe with Sheaves. FS-666, Coal Age, 520 N. Michigan Ave. Chicago, Ill.

BUSINESS OPPORTUNITY

RAIL-RIVER Coal Mines In midwest available on lease basis. Address BO-665, Coal Age, 520 N. Michigan Ave., Chicago, Ill.

6 YD. STRIPPER SHOVEL

200-B Bucyrus 6 years old. 75 ft. Boom, 60 ft. Dipper stick, 6 yd. Dipper Steam Shovel.

LIGHT PLANT

4 KW Kohler 120 V—Gasoline Lighting Plant.

DIESEL DRAGLINES

3W 4W & 5W Monighan Walkers, 90 to 110 ft. booms.
3 Yd. P.&H. 800, 97' boom.
2½ Yd. 48B Bucyrus 80' boom.
2 Yd. 750 Lima, 60' boom.

AIR COMPRESSORS:
(7) Steam 66 ft., 300 ft., 600, 1000 & 1940 ft.
(12") Belted, 360, 676, 870, 10000, 1300 ft.
(12) Diesel 105, 315, 520, 676 & 1000 ft.
(6) Electric, 1300, 1500, 2200, 2600, 5000 ft.
(14) Gasoline, 110, 160, 220, 310 & 370 ft.

COAL CRUSHERS:
Jeffrey Single Roll 18x18, 24x24 & 30x30
Link Belt 26x24 Double Roll Crusher

HYDRAULIC CARWHEEL PRESSES:
100 Ton, 150 Ton, 300 Ton, 300 & 400 Ton Caldwell - Niles - Wood - Watson Stillman

RUBBER CONVEYOR BELTS:
1000' 60", 600' 30", 300' 20", 1600' 42", 900' 48", 1450' 36", 1200' 24", 800' 18", 600' 16", 350' 14".

CONVEYOR PARTS:
Idlers, Heads & Tail Pulleys, Steel Frames, Tripper, etc., 14 In., 60 In. Large Stock here.

SYNC. MOTOR GENERATORS & ROTARYS:
100 KW Ridgway 1200 RPM 3/60/2300/250-275
150 KW G.E. 1200 RPM 3/60/2200-250-275
200 KW Ridgway 900 RPM 3/60/2200-250-275
3—100 KW G.E. 275 v. 1200 RPM Rotarys

STORAGE BATTERY LOCOMOTIVES:
2½ ton Whitcomb 24 ga. New Batteries
2—4 ton G.E. 30 in. ga.
3—5 ton Mancha 30 in. ga.
4—5 ton G.E. 36 in. ga.
3—7 ton Goodman 36 ga. Battery & Trolley
8—6 ton Baldwin Westgh. 42 ga. & 36 ga.

TROLLEY LOCOMOTIVES:
2½ ton Westinghouse 24 ga.
4—6 ton & 3—5 ton Goodman, 36 ga.
3—6 ton Goodman 30 ga.
4—6 ton Goodman 42 ga.
5—6 ton Westinghouse 42 ga.
2—8 ton Goodman 36 ga.
10 ton Goodman 42 ga. & 13 ton Jeffrey

VIBRATING SCREENS:
9 Tyler Hummer 3x6, 4x5, 4x8 & 4x10
2 Robins Gyrex 4x8½
4x12 Niagara, 3x8 L. B., 5x6 Simplex

CARS:
120—4 ton 42 ga. S.D. Mine Cars
60—Western 16-20-30 yd. Side Dump

SHOVELS, CRANES & DRAGLINES:
3 W 90' Boom, 6 & 160' Boom, Model 6150, 175' Boom, Diesel, Monighan Walkers
1 yd. K 50 Link Belt 50' Boom Crane
2 yd. Page 70' Boom Diesel Dragline
1¾ yd. Marion 450 Elec. Shovel
1½ yd. Lima Diesel Shovel & Dragline
2 yd. Link Belt Elec. Shovel & Dragline
25 ton Browning 50' Boom Loco. Crane
7 Conway 20A, 30A, 50A, 60 & 75 Muckers

MINE LOADERS:
Junior Joy 36 ga. Low Pan
Conway 20 Mucker
3—5 BU & 7 BU 36 or 42 ga. Joy
9—Goodman 200 & Jeffrey 441

MISCELLANEOUS:
5'x160' Traylor Rotary Dryer
100 HP G.E., 3/60/440 v.-900 RPM Elec. Motor
6—Goodman 12CA & 12DA 6 ft. Cutters
9x8 Sullivan Mine Compressors
Clamshell Buckets ¾, 1 1½ & 2 yd. Cap.
30 ton & 12 ton Vulcan Std. Ga. Gas. Loco.

WANTED TO BUY:
Complete Mines—M.G. Sets, Locomotives, Compressors, Conveyors, Cranes, Crushers & Rotary Converters. Also Rails, Screens, Pumps, Cars, Mine Loaders & Mining Machines.

Tidewater Equip. & Machy. Corp.
305 Madison Ave. New York, N. Y.

FOR SALE

100—New steel mine cars, 11' 4" overall length, 46" overall width, 38" height above rail. Equipped with Timken roller-bearing trucks. Present track gauge 26", but can be easily converted to 42" or 44" gauge. Would make excellent cars for use in rotary dump and can be purchased at less than today's new price. Immediate delivery. If interested, communicate with

Tennessee Products Corporation
Nashville, Tennessee
attention MR. ELDRED CAYCE
Purchasing Agent

Cars may be inspected at our mine, Whitwell, Tennessee

FOR SALE

ELECTRIC HOISTS

1—500 H.P. Double Drum, 1600' of 1¼" rope, 2300 volt motor, Ward-Leonard Control.
1—1300 H.P. Ottumwa Shaft Hoist with double cylindro-conical drum, suitable for 675' of 1¾" rope on each drum, 2300 volt.
1—1300 H.P. Double Cylindro-Conical drums, 880' of 1¾" rope on each drum. Contactor control—latest braking device.

JOY LOADING MACHINES

10—5-BU Joy Loading Machines, 250 volt. Just taken out of service, practically new condition, loading 450-ton per shift.

MINE CARS

400—3-ton, 44" gauge, end dump mine cars. Just taken out of service—excellent condition. Height overall 38", length 120", width 60", 16" Timken Roller Bearing Wheels. Link and pin couplers, 2¼" CRS axles, 30" wheel base. A bargain for quick sale!

Frank J. Wolfe

SHORTWALL MINING MACHINES

15—Jeffrey, 50 H.P., 250 volt DC, 7½' cutter bars. Complete with self-propelled trucks and 300' of good cable. Just taken out of service.
11—Sullivan CE-7 220/440 volt AC Machines, 7½' cutter bars. All on self-propelled trucks.

LOCOMOTIVES

24—6, 8, 10 and 15-ton completely rebuilt and some slightly used. Any type, make or gauge that you might be in need of.

COAL MINE EQUIPMENT SALES COMPANY
306-7 Beasley Building Terre Haute, Indiana

LINK-BELT UNLOADING TOWER

SUITABLE FOR COAL OR ORE
GANTRY TYPE • CAPACITY 750 T.P.H.
RAIL SPAN 44' • OVERALL HEIGHT 114' WIDTH 166'
COMPLETE WITH WIRING AND 8 SELF-CONTAINED 3 PHASE MOTORS AND BUCKET

ERMAN-HOWELL & CO., INC.
332 S. MICHIGAN AVE. ***CHICAGO, ILL.***

PIPE—MACHINERY—GAS ENGINES
AIR COMPRESSORS—DIESELS—PUMPS

Some Steam Engines and Boilers available only slightly above the metal price

BRADFORD SUPPLY COMPANY
WAYNE, WOOD COUNTY, OHIO **Near Toledo**

MINING MACHINES
Goodman Standard & Universal.
AC & DC Rebuilt & Guaranteed.

MINE LOCOMOTIVES
5 to 20 ton.

STRIPPING SHOVELS
M. G. SETS & ROTARY CONVERTERS
PUMPS and FANS
COAL CRUSHERS

Coal hopper with weigh pan and scale
Hydraulic Wheel Presses

Will buy, sell or exchange.
What do you need?

The Industrial Equipment Corp.
Warehouse: Carnegie, Pa.
P. O. Box 1647 Pittsburgh, Pa.

IRON and STEEL PIPE
New and Used

Large Stocks, all sizes
attractive prices

L. B. FOSTER COMPANY, Inc.
P. O. Box 1647 Pittsburgh, Pa.

FOR SALE
Steam Driven Air Compressors
Large Steam Pumps
Guaranteed Used Pipe
Steel Buildings
Tanks of all kinds and sizes

Jos. Greenspon's Son Pipe Corp.
Nat'l. Stock Yds. (St. Clair County) Ill.

FOR SALE

We may have available for sale in the near future the following equipment: 301 Koehring, 650 P & H and 450 Marion Loading Shovels and a 3-yard and 5-yard Monighan Dragline.

Address inquiry to

MORGAN COAL COMPANY
19 West 38th Street Indianapolis, Indiana

REBUILT EQUIPMENT—READY TO SHIP

MINING MACHINES—250 V. DC
2—Goodman Low Vein 36" ga. with reels & Cables
1—CE-9 Sullivan
1—12AA Goodman 36" ga.
1—Goodman Slabbing 42" ga.

MINE LOCOMOTIVES
1—5 ton Jeffrey Low Vein 250 v. DC 36" ga.
1—6 ton Atlas 36" ga. AC or DC
10 ton Milwaukee GASOLINE

ROTARY CONVERTERS
1—500 kw. G.E., type HC-8, 600 volt, 900 rpm, complete with transformers and switchboards
200 kw. G.E. 275 v. DC 900 rpm complete with transformers.

SPEED REDUCERS
1—1 HP D.O. James 1200 rpm. ratio 36:1
1—2 HP D.O. James 1200 rpm. ratio 9:1
1—3 HP Farrell Birmingham 1160 rpm. ratio 6:1
5—10 HP Horsburg 1200 rpm. ratio 6:1
2—10 HP D.O. James 1200 rpm. ratio 6.2:1
1—75 HP 875 rpm. ratio 8.5:1
1—150 HP Falk 1200 to 164 rpm.
1—450 HP Kerr Reduction Gear 3800 to 720 rpm.

M. G. SETS—SYNCHRONOUS
200 kw, West. 600 v. DC 600 rpm, 220/3/60.
150 kw, West. 275 v. DC 600 rpm. 2300/3/60.
1—150 KW Ridgway 275 v. 900 rpm. 2300 v. 3 ph. 60 cy.

A.C. GENERATOR—3 ph. 60 cy.
219 kva. G.E. 2200/440/220 v. 200 rpm.

HOISTS
25 HP. Thomas 18" face 20" dia.
40 HP. Single drum AC 220/3/60.
100 HP. Lidgerwood 2 drum AC or DC Motor.

ROCK DRILLS
1—Ft. Wayne—2¼ HP 230/500 v. DC Motor

TRACK DRILLS
2—Moore Track Drills #1

PICKING TABLE
1—Jeffrey Apron Conveyor 5 HP DC Motor

DC GENERATORS—250 V.
1—110 KW Cr. Wh. 720 rpm.
1—100 KW Morgan Gard. 500 rpm.
1—100 KW Jeffrey 500 rpm.
1—75 KW West. SK 1950 rpm.

TRANSFORMERS—1 PH. 60 CY.
25—5 KVA 2200 v. 122/244 G.E.
30—7½ KVA 2200 v. 122/244 G.E.
50—10 KVA 2200 v. 122/244 West.
3—15 KVA 2200 v. 122/244 G.E.
3—37 KVA 4400 v. 185 v. Rotary Transformer
4—60 KVA 6600 v. 550 v. Allis Challs.
3—100 KVA 6600 v. 220/440/550 v. Pgh.
3—150 KVA 2300 v. 6900 v. Pgh.
1—150 KVA 2080 v. 230/460 G.E. 3 ph.
1—250 KVA 2300 v. 460 v. G.E. 3 ph.
3—1500 KVA 22000 v. 6600 v. Allis Chal.

CENTRIFUGAL PUMPS
1—1300 GPM Gould 100' hd. 6 x 6
2—1000 GPM Cameron bronze 100' hd. 8 x 8
1—800 GPM Weinman 90' hd. 6 x 5
1—750 GPM Manistee 185' hd. 6 x 6
1—750 GPM DeLaval 70' hd. 6 x 6
1—Worthington 5 x 5 single stage mtd. on truck 15 HP motor
1—35 GPM Dayton Dowd 2 x 1

SLIPRING MOTORS—3 ph. 60 cy.

No.	HP	Make	Type	Volts	Rpm
1	700	G.E.	MT-432	2200	393
1	400	West.	CW-967A	220-440	1170
1	300	G.E.	I-M	220-440	600
1	260	Burke	EMV-65	220-440	600
3	250	G.E.	I-M	550	600
3	250	G.E.	I-M	2200/220/440	600
3	200	G.E.	I-M	2200/220/440	600
1	100	West.	CI	220/440	1750
1	75	West.	CI	220/440	860

SQUIRREL CAGE MOTORS—3 ph. 60 cy.

HP	Volts	Make	Type	Speed
400	2200/440/220	West.	CS	500
200	220/440	West.	CS	580
200	2200	West.	CS	870
150	550/220/440	G.E.	—	575
150	220/440	G.E.	KT-562	690

SQUIRREL CAGE MOTORS

HP	Volts	Make	Type	Rpm
250	220	G.E.	I-K	720
200	220	G.E.	I-K	600
200	220	G.E.	I-K	514
200	2200	West.	CS	900

SCALES
6—Fair. Morse #11½ 3 beams (2—200# ea. 1—50 lbs.) platform 16¼ x 21⅝.

DIESEL ENGINE SET
1—217 KVA G.E. 2300/220/440 v. 3 ph. 60 cy. 200 rpm. dir. con.
2—260 HP Buckeye horiz. 2 cyl. Diesel

DUQUESNE ELECTRIC & MFG. CO. . . . . PITTSBURGH, PA.

Immediate Shipment Low Prices

NEW RUBBER

Guaranteed High Grade

CONVEYOR and TRANSMISSION BELTING

CONVEYOR BELTING
ABRASIVE RESISTANT COVERS

Width	Ply	Top	Bottom	Covers
48"	8	1/4"		1/16"
42"	5	1/4"		1/16"
36"	6	1/4"		1/16"
30"	6	1/4"		1/16"
30"	5	1/4"		1/16"
24"	5	1/4"		1/32"
24"	4	1/4"		1/32"
20"	5	1/4"		1/32"
20"	4	1/4"		1/32"
18"	4	1/4"		1/32"
16"	4	1/4"		1/32"
14"	4	1/16"		1/32"
12"	4	1/16"		1/32"

TRANSMISSION BELTING
HEAVY-DUTY FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

ELEVATOR BELTING
HEAVY DUTY RUBBER COVERED

Width	Ply	Top	Bottom	Covers
12"	6	1/16"		1/16"
14"	6	1/16"		1/16"
16"	6	1/16"		1/16"
18"	6	1/16"		1/16"

ENDLESS "V" BELTS
"A" — WIDTH — All Sizes
"B" — WIDTH — All Sizes
"C" — WIDTH — All Sibes
"D" — WIDTH — All Sizes
"E" — WIDTH — All Sizes
Sold in Matched Sets

RUBBER HOSE
ALL SIZES FOR
AIR — WATER —
STEAM — SUCTION —
FIRE — WELDING
ETC.

Inquire For Prices :—: Mention Size and Lengths

CARLYLE RUBBER CO., Inc.
66 PARK PLACE New York, N. Y.

STRIPPING SHOVEL

6½ yd. Bucyrus 320-B Electric 90' boom

IRON & STEEL PRODUCTS, INC.
13484 S. Brainard Ave., Chicago, Illinois
"ANYTHING containing IRON or STEEL"

All around LATHE For General Maintenance

36" x 22' McCabe Screw Cutting Engine Lathe, can be motorized, standard change gears. Triple Geared type Headstock. Also, other lathes, shapers and milling machines. Write or wire your inquiries to

Cincinnati Machinery & Supply Company
217 E. Second St. Cincinnati, O.

ROTARY CONVERTERS
500 KW WEST. SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM, Pedestal type, 2300/4000 V. Transformers.
300 KW G.E. SYN. 575 V. HCC, 6 Ph., 60 Cy., 1200 RPM, form P, 2300-4000 V. Transformers.
200 KW AL-CH SYN. 275 V. 6 Ph., 60 Cy., 1200 RPM, Pedestal type, 2300/4000 V. Transformers.
150 KW G.E. SYN. 275 V. HCC, 6 Ph., 60 Cy., 1200 RPM, form P, 2300/4000 V. Transformers.
150 KW WEST. SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM, 2300/4000 V. Transformers.

MOTOR GENERATORS
300 KW G.E. SYN., 275 V., 2300/4000 V. 3 Ph., 60 Cy., 720 RPM, 80% P.F. Manual Switchgear.
250 KW G.E. SYN., 275 V., 2300/4000 V. 3 Ph., 60 Cy., 720 RPM, 80% P.F. Manual Switchgear.
200 KW G.E. IND., 600 V., 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM. Manual Switchgear.
200 KW R.W. SYN., 275 V. 2300/4000 V., 3 Ph., 60 Cy., 900 RPM, 80% P.F. Manual Switchgear.

LOCOMOTIVES
10-T WESTGHE, 250 V., 907-C Mts., 36"-44" Ga.
10-T WESTGHE, 500 V., 907-C Mts., 36"-44" Ga.
10-T WESTGHE, 250 V., 917-C Mts., 36"-44" Ga.
10-T WESTGHE, 500 V., 917-C Mts., 36"-44" Ga.
8-T JEFFREY, 250 V., MH-85 Mts., 24"-36" Ga.
8-T WESTGHE, 250 V., 906-C Mts., 33"-44" Ga.
8-T WESTGHE, 500 V., 906-C Mts., 36"-44" Ga.
6-T JEFFREY, 250 V., MH-88 Mts., 36"-42" Ga.
6-T JEFFREY, 500 V., MH-88 Mts., 36"-42" Ga.
6-T WESTGHE, 250 V., 904-C Mts., 36"-42" Ga.
5-T WESTGHE, 250 V., 902-B Mts., 56½" Ga.
4-T WESTGHE, 250 V., 902-C Mts., 36" G.
4-T GOODMAN, 250 V., 42-I Mts., 40"-44" Ga.

Each unit listed above is owned by us and is available now for immediate purchase.

WALLACE E. KIRK COMPANY
Incorporated
501 Grant Building Pittsburgh, Pa.

★ MINING EQUIPMENT READY FOR DELIVERY ★

GENERATORS
150-KW G. E. M-G set, 500 volt
150-KW Steam plant, 250 volt
100-KW Ridgway M-G set, 250 volt

LOCOMOTIVES
2—13-Ton Goodman, 250 volt, 48" Gage
1— 8-Ton West. 65, 250 volt, 42" Gage
3— 6-Ton West. 904-C, 250 & 500 volt, 42 & 44" Gage
1— 6-Ton G. E. 823, 250 volt, 44" Gage

CUTTING MACHINES
1—12-CA Goodman, 250 volt
2—12-AA Goodman, 250 volt
CE-7 Sullivans, 250, 500 & 220 volt
16— 12-G3 Goodman, 220 volt A. C. Motors
6—212-G3 Goodman, 220-440 volt, A. C. motors

MISCELLANEOUS
31½x36" Scotdale Double roll coal crusher
4—Track coal tipple complete with all machinery, motors and magnetic starters just as released from service. First class condition.
D.C. Motors ½ to 50-HP.
A.C. Motors 1 to 280-HP.

Many other items in stock. Let us know your needs—We buy, sell and trade.

ALL-STATE EQUIPMENT CO., Inc.
LOGAN, W. VA. PHONE 884

FOR SALE

Single Drum Mine Hoist manufactured by Ottumwa Iron Works. Drum 108 inches diam. x 84" face grooved for 1000 ft. of 1¾" cable. Also have lagging to cover drum if smaller cable is used. Proportional Pressure Oil Braking System and Lily Governor. Speed 700 ft. per minute.
Geared to 400 H.P. 2300 Volt. 3 phase, 60 cycle General Elecric Motor with complete contractor control and resistance.

Price $18,000.00
Available March 1, 1943

Also complete headframe, rock bin, self dumping muck cage and man cage with counter-balance attached.

Price on application
Available May 1, 1943

All of the above now in operation at Lackawack, N. Y., where it can be inspected.

MASON & HANGER CO., INC.
Lackawack, N. Y.

SEARCHLIGHT SECTION

LOCOMOTIVES

Goodman: All 250 volts.
1—10 ton, 31-1-4-T
1—6 ton, 30B, 48" 1—5 ton.
1—5 ton, W-1-2, 36"

Westinghouse: All 250 volt.
1—4 ton, 902, 48" 1—18-ton, 102, 42"
1—904 c. 44" 500 volt. Also 906 motors.
1—10 ton, 915

G.E.: All 250 volt. 5 ton 825, 44"
6 ton 803, 44", as is 4 ton 1022, 41, as is
6 ton 823, 44" 8 ton 839 motors.
6 ton 801

Jeffrey: 6 ton, and 4 ton, all gauges, 250 volt
2—**Jeffrey** MH 110 Locomotives

MINING MACHINES

Jeffrey, 35B, 29B, and 4—28A, 250 V. 2—29C with drop bar support.

Goodman, 12A, 12AB, 12AA, 12G3A, 34B.
1—12G3 250 volt and 2—112 DA, 500 volt.
2—Permissible Type 12CA. 10—112AA

Sullivan, CE7, CE9, CE10, CR10 Low Vein

SUBSTATIONS—275 volts, D. C.

2—200 KW **GE Rotaries** (600 volt)
1—200 KW **Ridgway** M.G. Set.
1—200 KW **G.E.** Rotary Converter.
1—200 KW **West.** Rotary.
1—150 KW **West.** Rotary.
1—150 KW, 1—100 K **Ridgeway** M-G Sets.
1—150 KW **Ridgeway** Rotary
1—150 KW **West.** Rotary converter.
1—100 KW **West.** M-G Sets-

AERIAL TRAMWAYS * HOISTS * PUMPS * MOTORS * TRANSFORMERS * BOND WELDERS * RESISTANCE * COMPRESSORS * DUMPS * SPEED REDUCERS FIELD FRAMES * ARMATURES * GOODMAN HYDRAULIC SHOVELS * MOTOR STARTERS AND CONTROLLERS—AC & DC * DROP BAR SUPPORTS (Gooseneck), 29B and 29C * MINING MACHINE TRUCKS * SWITCHBOARDS * CIRCUIT BREAKERS—AC & DC * CONVEYOR HOISTS * COAL CRUSHERS (double roll 12"x16", single roll 24"x36" 30"x30" 24"x24" and 18"x16" * Diamond BIT SHARPENER * TURBO-GENERATOR 500 K.W. 275 volt DC * ROPE & BUTTON CONVEYOR 400' long LATHES, SHAPERS * LINK BELT * ELECTRIC SLATE DUMP * SWITCHES to 85# and 100#, STEAM POWER PLANT, 2 Boilers 2 turbo-generators, 2300 volt, 1 Clam shell bucket 1¾ cubic yard, 1—Figure 8 drum. Coal Crrushers—18x16—24x24 and 30x30.

GUYAN MACHINERY COMPANY, Logan, W. Va.

USED
Mining Machines

For immediate delivery

4—Jeffrey Longwall Type. Serial Numbers 16995-6-7-8. Model 24-B. Year 1935.

1—Sullivan Longwall Type. Serial Number 11086.

1—6 ton Over-motored Goodman Locomotive. Type 3204 T 2. Mfg. Serial Number 2727.

2—40 H.P. Motors. 42" Gauge, 250 V.D.C., 28" Steel Wires.

CLONICK STEEL CO.
2375 S. Archer, Chicago, Ill.

BELT CONVEYORS IN STOCK

12"-14"-16"-18"
20"-24"-30"-36"

ALSO

CONVEYOR BELTING

CATALOG P ON REQUEST

"The test of time since '99"

TEUSCHER PULLEY & BELTING CO. 801 N. 2nd ST., ST. LOUIS, MO.

WE BUY AND SELL
MOTORS
TRANSFORMERS
MOTOR GEN. SETS
OIL SWITCHES
AIR CIRCUIT BREAKERS

ELECTRIC EQUIPMENT CO.
678 Lake Ave., Rochester, N. Y.
Tel: Glenwood 6783

RAILS and ACCESSORIES

RELAYING RAILS—Super-quality machine-reconditioned—not ordinary Relayers.
NEW RAILS, Angle and Splice Bars, Bolts, Nuts, Spikes, Frogs, Switches, Tie Plates, and all other Track Accessories.

Phone, Write or Wire

L. B. FOSTER COMPANY, Inc.
PITTSBURGH NEW YORK CHICAGO

FOR SALE

8, 5BU Loading Machines

A. C. MOTORS

30 Units, 15 to 75 H.P. squirrel cage 3/60/440

D. C. MOTORS

15 Units, 3 H.P. to 60 H.P., 230 V.
40 KW, 110 V. D.C. Generator
200 KW, 600 V. Motor Generator Set synch. motor, 3/60/2200
1000 KW Turbine Type G.E. Generator 3/60/2300, 3600 RPM
500 KW G.E. Skinner Uniflow Steam Engine Generator, 250 V. D. C.
6½-yd. 320-B Bucyrus Stripping Shovel

IRON & STEEL PRODUCTS, INC.

38 years' experience
13484 S. Brainard Ave., Chicago, Illinois
"*Anything* containing IRON or STEEL"

FOR SALE

1—One **NORDBERG Hoist** No. 06392, 4 ft. drum, hydraulic brake direct connected 150 h.p., GE motor AC, 440 v. 3 ph. 60 cycle, speed 585, complete with panel board and ammeter.

3—One **POMONA Vertical Pump,** 75 h.p., AC, 250 v. 60 cy. 3 ph. Westinghouse motor, together with starting compensator, capacity 1000 gal. per min., 200 feet head.

4—One **ALLIS CHALMERS Pump,** type BS 13406, 100 h.p., motor AC, 220 v. 60 cy., 3 ph., capacity 1000 gal. per min., 250 feet head.

All of the above equipment in first class operating condition

FS-200, Coal Age
520 No. Michigan Ave., Chicago, Ill.

FOR SALE

COMPLETE POWER PLANT

With two 516 H.P. Stirling Boilers, two 500 KVA turbine driven Generators with barometric condensers, Cookson water heaters, super heaters, chain grate stokers, and all necessary piping. Also steam driven compressors, steam driven hoist, approximately 20,000 feet of 1½" and 1¼" cable. Also seven 250 H.P. 120# working pressure Firebox Boilers and a number of HRT Boilers.

P. O. Box 1931, Butte, Montana

USED
SPEED REDUCERS

All types—sizes up to 300 H.P.
Falk—Link Belt—James—Cleveland, Etc.

CONVEYING EQUIPMENT
Save 60% of New Net Costs
All Materials, Overhauled, Guaranteed

Immediate Delivery

PATRON TRANSMISSION CO.
154 GRAND ST. NEW YORK

NEW and REBUILT
STORAGE BATTERY
LOCOMOTIVES
1½ to 10 Ton — 18" to 56" Track Gauge
GREENSBURG MACHINE CO.
Greensburg, Penna.

RAILS—CARS

All sections of rails and good serviceable second hand cars, all gauges, also spikes, bolts, frogs, switches and ties.

M. K. FRANK
480 Lexington Ave., New York City
450 Fourth Ave., Pittsburgh, Pa.

HOIST

1—Ottumwa double drum, single gear reduction Electric Shaft Hoist, complete, in first-class condition, with 60 horsepower, 600 revolution, 220 volt, 3 phase, 60 cycle, General Electric motor.

LESLIE E. BRYANT
Clarksville, Arkansas

Prompt Shipment From Our Warehouse

MINING MACHINES
2—12 G3 Goodman 220/3/60 AC 6' Bar.
3—12 AB Goodman 250 V. DC 6' Bar.
2—35 B. Jeffrey 250 v. 6' Bar #18972 with Bowdil Chain and #11416, both with cables.

LOCOMOTIVES (Battery)
5 Ton Jeffrey storage battery 42 to 44" Ga.
5 Ton Ironton Type E2, 36" Ga.
4 Ton Jeffrey 44" Ga.

(Haulage)
13 Ton Jeffrey 250 V. 40" 42" Ga. M.H. 110 Motors.
8 Ton Westgh. 250 V. 36" Ga.

MG SETS 3 ph. 60 cy. (Syn.)
150 KW Ridgway 250 V. DC 2200 V. AC 900 RPM.
150 KW West. 550 V. DC 2200 V. AC-1200 RPM.
100 KW G.E. 550 V. DC 2200/3/60 AC 900 RPM.
90 KW Al.Ch. 250 V. 2200 V. AC 900 RPM.

ROTARY CONVERTERS
1—150 KW HCC-6 Gen'l Elec. 275 v. 1200 RPM with switchboards and Transformers 2300 or 4000 v. 3 ph. 60 cy.
150—KW G.E. Type HCC 6—250/125 v. 1200 RPM with 3—50 KVA G.E. Trans. 2300/400 v.
1—500 KW HCB Gen'l Elec. 275 v. with switchboards and Trans. 6600 or 3800 v. 3 ph. 60 cy.

SYN. MOTORS 3 ph. 60 cy.

HP	Make	V.	Speed
350	Al. Ch.	2200	600

HIGH TORQUE WOUND ROTOR MOTORS (Wound Rotors)

HP	Make	V.	Speed
200 (5)	G.E.	2200	600
150 (4)	G.E.	2200	600
125 (1)	G.E.	2200	600

SLIP RING & SQ. CG MOTORS (3 ph. 60 cy.)

HP	Make	Speed	Wdg.	Type
700	G.E.	393	S.R.	MT 432
400	West.	500	S.C.	CS
300	G.E.	600	S.R.	IM
200	G.E.	250	S.R.	MT 412
200	Al. Ch.	600	S.C.	
150	G.E.	720	S.R.	IM
150	West.	580	S.C.	CCL
150	G.E.	600	S.R.	IM
125	Al. Ch.	435	S.R.	
100	G.E.	500	S.R.	MI-25 cy.
100	Al. Ch.	900	S.C.	
75	G.E.	865	S.C.	KT

HOISTS
75 HP Lidgerwood sgl. fr. drum
50 HP Diamond 2 drums same Shaft
30 HP Clyde sgl. drum AC Motor
15 HP Lidgerwood sgl. dr. AC Motor

400 TRANSFORMERS (Westgh. & GE 1 ph.)

Qu.	KVA	Pri. V.	Sec. V.
3	1	2080/2200	115/230
5	2	"	"
100	5	"	"
82	7½	"	"
71	10	"	"
1	30	"	"
3	37 Rotary	4400/185	
1	100	2300 3 Phase	230/460
1	150	"	230/460

ENGINE GENERATOR SETS
100 KW 250 v. DC Westgh.—Skinner Engine
25 KW 125 v. Sturtevant—40 HP Turbine.

D. C. MOTORS
1 to 125 HP, all speeds.

MOORHEAD-REITMEYER CO., INC.
PITTSBURGH, PENNSYLVANIA

MINING EQUIPMENT

1—100 KW, 250/275 volts, DC. G.E. Rotary Converter with 2300 volt Transformer & Switchboards.
1—200 KW, 6 phase, 60 cycle, General Electric Rotary Converter.
1—Motor Operated Brush Raising Mechanism for Rotary Converter.
3—165 KVA, 6600 volt, General Electric Rotary Converter Transformers.
3—100 KVA, Rotary Transformers, will rewind for 6600 volts or lower.
3—55 KVA, 2300/4000Y volts, General Electric Rotary Transformers.
1—Ingersoll-Rand Portable Air Compressor with texrope V belt drive.
3—Oxide Film Lightning Arrestors for 33000 volts and below.
Motors: 3 to 50 HP, AC & DC in stock. Different types, speeds & voltages.
Rebuilt Distribution Transformers.
5-Ampere recalibrated Wathour Meters.

R.H. Benney Equipment Company
Norwood, Ohio

MINE EQUIPMENT
FOR SALE

Locomotives—Mining Machines—Pumps—Motors—Transformers — Steel Tipples — Rescreeners — Steam Hoists — Electric Hoists — Compressors — Loading Booms—Engines—Generators—Scales—Miscellaneous Mine Equipment

Complete Mines dismantled and sold.

HAIR EQUIPMENT COMPANY
Office and Warehouse
Reed and Election Streets
BENTON, ILLINOIS

COAL CUTTING MACHINES

3—35B Jeffrey 250 V Shortwalls.
2—35B Jeffrey 500 V Shortwalls.
1—35BB Jeffrey 250 V. Permissible Shortwall.
1—35BB Jeffrey 500 V Permissible Shortwall.
1—29LE Jeffrey T.O.H. Arcwall 250 V Permissible.
1—12AB Goodman 250 V Shortwall.
2—12A Goodman 500 V Shortwalls.
1—29B Jeffrey Arcwall 250 or 500 V.
1—12G3 Goodman AC Shortwall 3/60/220/440 V.

LOCOMOTIVES
1—8 Ton G. E. with HM-839 250 V. motors.
1—8 Ton West. with 906 motors 250 V.
1—6 Ton G. E. with 250 V motors.
1—6 Ton Jeffrey with MH-88 motors.
2—5 Ton G. E. with HM-825 motors and reels.

MISCELLANEOUS
1—75 KW West. Syn. M-G Set, 250 V DC, 3/60/220 V AC, 1200 RPM, complete with switchboard.
1—150 HP West. Type CW Slip Ring Motor, 3/60/2200 V RPM.
1—185 HP Burke Squirrel Cage Motor, 3/60/2200 V 1150 RPM.
1—Sullivan Bit Sharpener.
1—36 x 36 Single Roll Coal Crusher.
1—30 x 36 Link Belt Double Roll Coal Crusher.
1—25 HP West. Type HK, 250 V Series Wound Hoist Motor, 600 RPM.
1—500 KW West. 6 phase Rotary Converter, 500 V DC.
1—100 HP Crocker-Wheeler Syn. Motor, 3/60/240 V, 1200 RPM.
8—150 KVA Pittsburgh 1/60/6600/220/440 V Transformers.
3—100 KVA G. E. 13,200/600/2200 V Trans.
2—37½ KVA Pittsburgh 2200/220/440 V Trans.

TIPPINS MACHINERY COMPANY
3530 Forbes St. Pittsburgh, Pa.

WANTED

-TRANSFORMERS-

TRANSFORMERS WANTED

in operating condition or burnt out. Mail us list giving complete nameplate data and stating condition.

We Rewind, Repair and Redesign all Makes and Sizes
ALL TRANSFORMERS GUARANTEED FOR ONE YEAR
We invite your inquiries

THE ELECTRIC SERVICE CO., INC.
"AMERICA'S USED TRANSFORMER CLEARING HOUSE"
STATION M Since 1912 CINCINNATI, OHIO

MINE HOISTS

1—Diamond 12" Drum 20 HP electrical equipment.
1—Vulcan 30" Band Friction with 50 HP electrical equipment.
1—Connellsville 54" Drum Haulage Hoist with 100 HP electrical equipment.
1—Lidgerwood 42" Drum with 150 HP electrical equipment.
1—Lidgerwood Cylindo-Conical Drum 200-1¼ with 350 HP electrical equipment.

And other hoists to suit all mining conditions

Jones Mining Equipment Co.
541 Wood Street Pittsburgh, Pa.

"Opportunity" Advertising:
Think
"SEARCHLIGHT"
First

WANTED!
16, 20, 24 or 30 cubic yard
AIR DUMP CARS—
Any quantity, type, make or location.
Also 10 to 30-ton Gas or Diesel Locos.
IRON & STEEL PRODUCTS, INC.
38 years' experience
13484 S. Brainard Ave. Chicago, Illinois
"*ANYTHING* containing IRON or STEEL"

COAL AGE ADVERTISERS IN THIS ISSUE

An asterisk preceding manufacturer's name indicates detailed information may be found in the 1942 *COAL MINING CATALOGS.* Where † appears after a company's name the advertisement does not appear in this issue, but was in preceding issues.

■

■

SEARCHLIGHT SECTION

(Classified Advertising)

American Cable TRU·LAY *Preformed*

...is a SAFER ROPE TO HANDLE

Believe it or not, industrial accidents cost the United States (last year) 37,500,000 forty-hour *weeks* of productive time. The interest of our national welfare demands that nothing be left undone to reduce this terrific toll. Look: that amount of productive time is enough to build 8 more battleships, plus 40 more destroyers, plus 3600 more bombers, plus 16,000 more tanks. It is your patriotic duty to do everything possible to protect yourself and others from accidents—that we may produce more weapons of victory.

One way many operators have reduced time-out accidents is through the adoption of American Cable **TRU-LAY PREFORMED WIRE ROPE.** American Cable **TRU-LAY** is a *safer* rope to handle because it is preformed. Being preformed, **TRU-LAY** is flexible, tractable, willing to do what is required of it without crankiness. It resists kinking and snarling and possesses remarkable fatigue-resistance. More than this, broken crown wires in **TRU-LAY PREFORMED** do not wicker out to jab and tear workmen's hands. That is one of the big reasons why **TRU-LAY PREFORMED** is a safer rope. For your next line, specify American Cable **TRU-LAY PREFORMED.** All American Cable ropes identified by the Emerald Strand are made of Improved Plow Steel.

AMERICAN CABLE DIVISION

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT, CONNECTICUT

ESSENTIAL PRODUCTS . . . TRU-LAY Aircraft, Automotive, and Industrial Controls, TRU-LOC Aircraft Terminals, AMERICAN CABLE Wire Rope, TRU-STOP Brakes, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Castings, CAMPBELL Cutting Machines, FORD Hoists, Trolleys, HAZARD Wire Rope, Yacht Rigging, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*

NOW, more than ever, take GOOD Care of GOOD EQUIPMENT

● The suggestions that follow are based on long experience and are given out, in the knowledge that they can be of definite value, both in your equipment conservation and greater production efforts. To save equipment from overloads and shocks that cause breakdowns, it is advisable to operate as continuously and uniformly as possible throughout shifts and not in intermittent spurts, at speeds much higher than rated capacities. Frequent and thorough inspection and lubrication will detect potential failures and with prompt attention to small repairs, major replacements will be averted.

Link-Belt Maintenance Parts Service

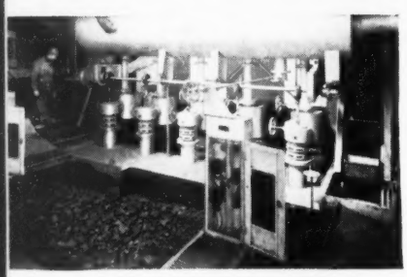
Obviously, delivery of maintenance parts is much slower than in normal times due to material shortages. Our stocks are, therefore, much smaller, and we suggest that you check your equipment now and place orders for parts likely to require early replacement as far in advance as possible.

LINK-BELT COMPANY

Chicago, Indianapolis, Philadelphia, Pittsburgh, Wilkes-Barre, Huntington, W. Va., Denver, Kansas City, Mo., Cleveland, Detroit, St. Louis, Seattle, Toronto, Vancouver

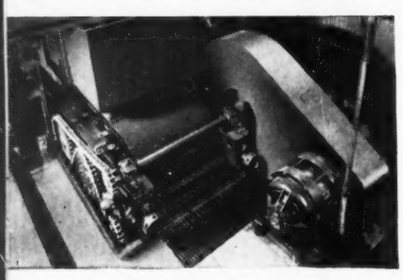
SHAKING SCREENS

Tight connections with minimum "play" in reciprocating parts are essential to long life. Frequent inspection, ample lubrication required. Keep all bolts tight. Proper adjustment of bushings in connecting rods may prevent a serious breakdown. Spare drive shaft, eccentrics, and connecting rods are good insurance against delays if these vital parts fail.



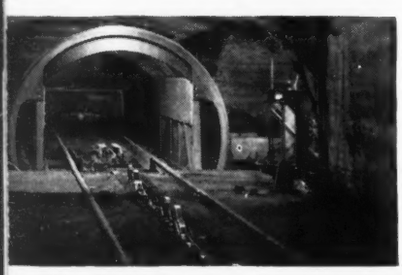
WASHING UNITS

Inspect frequently. Remove accumulation of "tramp" iron that might damage refuse elevators and replace worn buckets and chain parts promptly.



SIZER-CRUSHERS

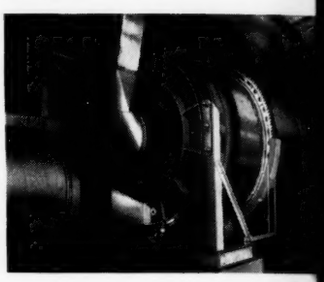
Worn and misaligned rolls not only produce excessive oversize but put heavy strain on the entire machine. New rolls or new segments will give a more uniformly-sized product and also protect machine against possible damage.



CAR DUMPERS, FEEDERS AND HAULS

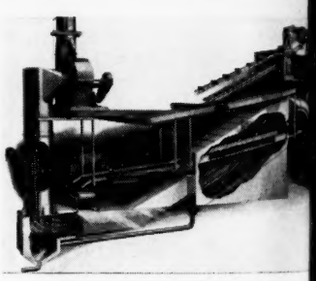
Cleanup regularly and frequently. An accumulation of dirt on rings and rollers will cause excessive wear in these moving parts, as well as bearings. Worn brakes and cars badly out of shape may wreck the dumper.

Wear, in chain links and pins increases chain pitch and may lead to broken sprockets. Loose bearing bolts may lead to broken gears. Worn brakes (on car hauls) may allow trip to get out of control and wreck cars and equipment.



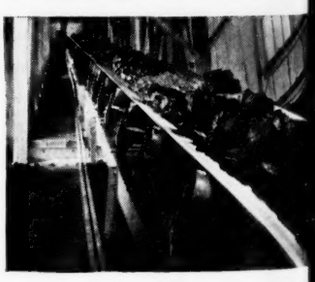
DRYERS

All moving parts should be lubricated frequently and properly adjusted. Check trunnions for alignment to prevent undue wear and so that overloads will not be thrown on the bearings. Keep bearings clean and replace if worn. Temperature control should be inspected for accuracy—to prevent overheating of the various parts or product, or an excessive use of fuel. Replace fans if out of balance or vibrate. Furnaces should also be checked and refractories replaced where broken.



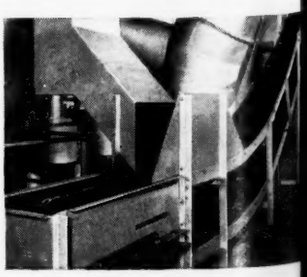
BELT CONVEYORS

Belts under improper tension or not tracking correctly will wear rapidly. Idlers should be accurately lined up and the right amount of counterweight provided for maximum life and efficiency of belts, idlers and driving equipment.



CHAIN CONVEYORS AND ELEVATORS

Bent flights or buckets may pull chains out of line and off sprockets, wrecking conveyor elevator. It's easier to replace a few pins, bushings, links, flights, or buckets than to rebuild a wrecked machine. Proper tension in chains (not too loose or too tight) prevents many breakdowns. 9031



LINK-BELT

HANDLING AND PREPARATION EQUIPMENT